FEDERAL STATE BUDGETARY INSTITUTION OF SCIENCE
VOLOGDA RESEARCH CENTER OF THE RUSSIAN ACADEMY OF SCIENCES

ECONOMIC AND SOCIAL CHANGES:

FACTS, TRENDS, FORECAST

Volume 13, Issue 6, 2020

The journal was founded in 2008

Publication frequency: bimonthly

According to the Decision of the Ministry of Education and Science of the Russian Federation, the journal *Economic and Social Changes: Facts, Trends, Forecast* is on the List of peer-reviewed scientific journals and editions that are authorized to publish principal research findings of doctoral (candidate's) dissertations in scientific specialties:
08.00.00 – economic sciences;
22.00.00 – sociological sciences.

The journal is included in the following abstract and full text databases:
Web of Science (ESCI),
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Ulrich's Periodicals Directory,
VINITI RAS,
Russian Science Citation Index (RSCI).

The journal's issues are sent to the U.S. Library of Congress and to the German National Library of Economics.

All research articles submitted to the journal are subject to mandatory peer-review.
Opinions presented in the articles can differ from those of the editor. Authors of the articles are responsible for the material selected and stated.

ISSN 2307-0331 (Print)
ISSN 2312-9824 (Online)

Internet address: **http://esc.volnc.ru**

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 agreements are signed with Jiangxi Academy of Social Sciences (China, 2014), National Academy of Sciences SM TsSaiSI (Belarus, 2014). Protocols of intent are signed with the Academy of Social Sciences Jiangxi Mao Zhiyong (China, 2014), National Institute of Languages and Civilizations (France, Jean Verkey, 2014).

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

2016 – Cooperation agreements are signed with EHESS Ecole des Hautes Etudes en Sciences Sociales (Paris, France, 2016), Institute of Philosophy, Sociology and Law of NAS RA (Yerevan, Armenia, 2016), Yerevan Northern University (Armenia, 2016), Yerevan State University (Armenia, 2016). Protocols of intentions are signed with Academy of Social Sciences in province Jiangxi (China, 2016).

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Review

DOI: 10.15838/esc.2020.6.72.1
UDC 330:001.89, LBC 65.054

The Problems of Sustainable Development and Strategic Planning in the Studies of the Vologda Research Center of RAS*

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Abstract. The article introduces the readers to the most important studies of the Vologda Research Center of the Russian Academy of Sciences, which celebrated its thirtieth anniversary this year. The subject of the Center's scientific research was formed during a rather difficult period of the country's development. In the early 1990s, the Russian Federation embarked on a path of market transformation. The adopted liberal concept of the country's transition to the market proclaimed the incompatibility of the plan and the market. Planned management methods were rejected everywhere. The management paradigm adopted was based exclusively on market mechanisms for regulating socio-economic processes at all levels of government. This resulted not only in the increase of negative trends in the economy and social sphere, but in Russia's descent into the abyss. The situation required finding ways out of the crisis and the country's transition to a model of sustainable development. Scientific and methodological support for solving this problem at the regional level has become the core in determining the subject of the scientific studies of the Vologda Research Center of RAS. The purpose of the work is to make a review of the research carried out by the Vologda Research Center of RAS on the problems of sustainable development and strategic planning as one of the most appropriate tools for solving this issue.

Key words: socio-economic development, sustainable development, factors of sustainable development, management methods, strategic planning, methodological tools.

* The article is prepared in accordance with the state assignment for the Vologda Research Center of the Russian Academy of Sciences, research project no. 0168-2019-0005 "Research of factors and methods of sustainable so-cio-economic development of territorial systems in changing global geopolitical and geo-economic conditions".

For citation: Uskova T.V. The problems of sustainable development and strategic planning in the studies of the Vologda Research Center of RAS. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 9–23. DOI: 10.15838/esc.2020.6.72.1

Introduction

The laws of the world globalization processes largely determine the development of the world economy, countries, and territories. It is subjected to many factors that are highly dynamic, often unpredictable, and increasing uncertainty. The authorities' ability to respond to the emerging threats and challenges timely, using adequate forms, methods and tools for managing socio-economic processes is the key to sustainable development. This thesis is confirmed by the results of the socio-economic development of the Russian Federation, which embarked on the path of market transformation in the early 1990s.

The transition of the Russian Federation to market relations and the integration of the national economy into the world economy significantly changed the socio-economic development of the country and its constituent regions over all parameters. The course of radical reforms chosen by the liberals, the concept of incompatibility between the plan and the market, and the ill-considered reforms implementation brought the country to the brink of disintegration as a state. Socio-economic indicators have acquired a stable negative trend. The country was slowly but steadily descending into the abyss [1]. Later, evaluating the reforms effectiveness, Academician S. Glazyev and others were writing: "...over the years of reform the country was thrown back decades in terms of socio-economic development, and according to some parameters – to the pre-revolutionary period. There has never been such a long and deep decline in the level of production in almost all sectors of the domestic economy in the foreseeable period, even after the destruction of Hitler's invasion" [2].

By the end of 1995, it had become clear that the practical implementation of the chosen development model of the Russian economy did not justify itself. The country needed a new paradigm of transformation that could put it on the path of sustainable socio-economic development. At this time, the constructive part of the Russian society, including domestic scientists, enthusiastically took up the idea of developing and implementing a new paradigm of global, regional and national development as sustainable development, which became widely known after the UN Conference on Environment and Development, held in Rio de Janeiro in 1992. The concept appeared to be attractive for the Russian Federation primarily due to the principles laid down in its basis, as well as the objectives to be solved that were in tune with the objectives facing the Russian society [3].

The Vologda Research Center of the Russian Academy of Sciences (VolRC RAS), which celebrates its thirtieth anniversary this year, did not stay on the sidelines when finding the ways to move to the path of sustainable socio-economic development of the country and its territories. Sustainable development of territories and municipalities in the context of socio-economic space transformation is one of the priorities of the Center's scientific research.

The article was prepared in order to introduce scientists interested in the problem of sustainable development, a wide range of readers with an overview of the research on this issue conducted by the Vologda Research Center of the Russian Academy of Sciences.

Formation of the methodology for managing sustainable socio-economic development of the region

The problem of sustainable development has been of concern to the scientific community for several decades already. The Russian scientist V.I. Vernadsky laid its theoretical foundations. The system of his scientific views on the development of the biosphere [4] anticipated the awareness of global problems by the general public. Since the late 1980s, the theory and practice of sustainable development have been the focus of attention of scientists and politicians both in Russia and abroad.

Vologda scientists began to search for ways of bringing the regional economy to the path of sustainable development almost from the moment when the research organization was created in Vologda. The theoretical and methodological basis of these studies was made up of the works on the problems of sustainable development of the world

system by Kh. Bossel [5], V.I. Danilov-Danilyan [6], O.K. Dreyer[1], D. Meadows[2], N.N. Moiseev [7], V.V. Novozhilov [8], and others; the works on the sustainability of national socio-economic systems by S.N. Bobylev, V.M. Zakharov [9], N.P. Vashchekin, V.A. Los', A.D. Ursul [10], V.A. Koptyuga, V.K. Levashov, V.M. Matrosov [11], E.A. Kuklina [12], V.V. Popkov [13] and others. An invaluable contribution was made by research on various aspects of regional socio-economic systems and their transfer to the model of sustainable development, presented by M.G. Ganopolskii [14], O.P. Pchelintsev [15], A.I. Tatarkin [16], and research on the problem of sustainability of micro-level socio-economic systems and individual subsystems described in the works of T.M. Konoplyanik[3], E.V. Makarova[4], and others.

The very first works performed at the Vologda Research Center of the Russian Academy of Sciences under the academic supervision of V.A. Ilyin described scientifically based measures aimed at solving this problem. These works primarily focused the regional authorities on stabilizing activities in the leading sectors and complexes of the regional economy, determining long-term goals for economic and social development. The authors proved that, despite the most acute problems, it is unpromising to focus only on the current issues.

If until the end of the 1990s the Vologda scientists had studied certain factors of sustainable development, then from the beginning of the 2000s they began to study the issues of sustainable development of the Vologda Oblast and individual municipalities, which became rather independent in solving territorial issues under the conditions of transformation.

It is crucially important to emphasize that the study of sustainable development was launched with the study of stability of sectors important for the region, i.e. agriculture, forestry and engineering, due to their importance for the economy of all municipalities and the Vologda Oblast as a whole. Their progressive development ensured sustainable economic growth and increased the region's development sustainability on this basis.

We should note that it is difficult to overestimate the importance of agriculture for the Vologda Oblast. However, in the first years of market transformations, this sector of the regional economy showed the deepest decline. The Vologda scientists (V.A. Ilyin, M.F. Sychev, A.A. Pashko)[5] organized the monitoring of the situation in the agro-industrial complex from the very beginning of the Center's functioning. Its results indicated an increase in negative trends, destabilization of the situation in the regional agro-industrial complex. With the aim of getting agriculture and its individual businesses out of the crisis, accelerating its progressive development, realizing the capacity of agricultural production and stabilizing the situation in the rural economy, the Centre's researchers proposed and substantiated a set of measures for the regional policy. These measures included developing multiculturalism in agriculture, integration of economics and management through the creation of organizational and economic structures, able to concentrate the products motion control in the processing chain in the hands of the few, minimize transaction costs, increase the amount of profit received, become the initiator of attracting external investments, act as a guarantor of profitability and safety of the invested funds, be the manager of capital investments [17].

A research laboratory was organized in the Center in order to restructure the timber industry enterprises, to stimulate their activities to increase the production efficiency and products competitiveness, to increase labor productivity, to

[1] Dreyer O.K., Los' V.A. *Ecology and Sustainable Development: Study Aid*. Moscow: URAO, 1997. 224 p.

[2] Meadows D.H., Meadows D.L., Randers J. *Beyond the Limits of Growth: Study Aid*. Translated from English. Ed. by G.A. Yagodin. Moscow: Progress; Pangea, 1994. 304 p.

[3] Konoplyanik T.M. *Managing the Sustainability of Economic Systems: Theory and Methodology: Doc. of Sci. (Economics) dis. abs. 08.00.05*. Saint Petersburg, 2007. 37 p.

[4] Makarova E.V. *Stability of the Economic System in the Conditions of Globalization of the World Economy: Cand. of Sci. (Economics) dis. abs. 08.00.05*. Ulan-Ude, 2006. 23 p.

[5] Pashko A.A., Ilyin V.A., Sychev M.F. *Agro-Industrial Complex of the District: Reform and Development*. Vologda: VNKTs TsEMI RAN, 1997. 97 p.

reduce production costs (*S.A. Shulev (supervisor), Z.S. Mironova, T.N. Stateeva, and others*[6]). Already in 1997, the laboratory employees, with the active participation of the Forestry Department, developed the "Concept of stabilization of the work and development of the timber industry of the Vologda Oblast for the period of 1998–2005" [18]. For the timely action of the regulatory impact to reduce the tension the researchers substantiated the necessity to organize regular monitoring and forecasting of forestry development [19]. Several years later, the Center's researchers (*T.V. Uskova, T.N. Trunova, Z.S. Mironova, K.A. Zadumkin, A.V. Mironov, R.Yu. Selimenkov*) developed sustainability criteria for timber industry in the region and the methodology for its assessing, proposed the measures to improve the sustainability of the regional forestry in the long term[7], substantiated the importance of forest certification for the sustainable development of the forest complex[8].

Some works of the Center's scientists (*V.V. Mitenev, M.F. Sychev, O.S. Moskvina, O.B. Kirik, and others*)[9] were devoted to the problems of functioning of the Vologda Oblast industry, primarily the machine-building industry which is a field of activity having a significant innovative potential and can become a driver of economic growth. The machine-building complex played a special role for the city of Vologda which located 11 of the 14 most important machine-building plants of the region which produced 98% of the products of large and medium-sized enterprises of the industry. The share of machine-building and metalworking made up 33% in the output of industrial products of the city, almost 50% in the main industrial funds. The plants employed about a half of those engaged in the Vologda industry. Consequently, the stability of a large city depended to a certain extent on the progressive development of machine-building. However, the analysis made it possible to identify deep negative changes that occurred in the industry during the period of 1991–2001, and trends that emerged during market transformations [20]. The research staff explained the strategy and tactics of regional industrial policy aimed at easing the crisis in the industry, identified the priorities for capacity contribution of machine-building in socio-economic development of the city and the region by stimulating innovation processes [21]. Later, the researchers substantiated the ways to stabilize and accelerate the development of the machine-building complex of Vologda and developed a comprehensive program of industrial activity and the formation of cluster systems[10].

Without dwelling on other factors of economic growth ensuring the region's sustainable development, we shall note only the main scientific works[11] that present the results of these studies [22; 23; 24 etc.].

In the early 2000s, a comprehensive study on the problems of managing the sustainable development of regional socio-economic systems was carried out (*T.V. Uskova*)[12]. In the course of the study the author

[6] Grachev V.V., Ilyin V.A., Sychev M.F., Shulev A.S. *Timber Industry Complex: Problems and Solutions*. Vologda: VNKTS TSEMI RAN, 1997. 52 p.; Mironova Z.S., Stateeva T.N., Shulev A.S. *Indicative forecasting of the development of the regional timber industry complex*. Ed. by M.M. Polyakov. Vologda: VNKTS TSEMI RAN, 2000. 59 p.

[7] Uskova T.V. *Stability of the Timber Industry Complex of the Vologda Oblast in the Conditions of the Market Strategy of its Development: Final Research Report*. Executed by T.V. Uskova, T.N. Trunova, Z.S. Mironova, K.A. Zadumkin. Vologda, 2005. 82 p.

[8] *Forest Certification as a Factor of Sustainable Development of the Forest Complex of the Region: Research Report*. Executed by T.V. Uskova, R.Yu. Selimenkov, A.V. Mironov. Vologda, 2011. 87 p.

[9] Mitenev V.V. *Machine-Building of the Vologda Oblast: Problems and Trends*. Vologda: VNKTS TSEMI RAN, 2002. 111 p.; Mitenev V.V., Sychev M.F. Innovative processes in machine-building of the Vologda Oblast. Ed. by M.M. Polyakov. Vologda: VNKTS TSEMI RAS, 2004. 47 p.

[10] *Development of a Comprehensive Program of Industrial Activity and Formation of Cluster Systems in the Vologda Oblast for the Period up to 2010: Research Report*. Executed by V.V. Mitenev, T.V. Uskova, K.A. Zumkin. Vologda, 2006. 124 p.

[11] Ilyin V.A., Selyakova S.A., Moskvina O.S., Uskova T.V. *Service Industries in the Town: Problems and Prospects*. Vologda: VNKTS TSEMI RAN, 2005. 108 p.; Moskvina O.S. *Industrial Policy – The Core of Economic Modernization*. Vologda: VNKTS TSEMI RAN, 2003. 135 p.; Anchukova N.V., Moskvina O.S. Tourism in the Economy of the Region. Vologda: VNKTS TSEMI RAN, 2002. 72 p.

[12] Uskova T.V. Managing the Region's Sustainable Development. Vologda: ISERT RAN, 2009. 355 p.; Uskova T.V. Sustainability of Territorial Development and Modern *Management Methods*. Problems of Territory's Development, 2020, no. 2 (106), pp. 7–18. DOI: 10.15838/ptd.2020.2.106.1

developed theoretical and methodological basis for sustainable development, defined the approaches to the essence of this concept, classified the types of resistance, and substantiated the internal factors which could increase the stability of the regions' socio-economic development. The researcher emphasized that the modern interpretation of sustainable development significantly expands its essence and the range of tasks to be solved [11; 13; 25, etc.]. In general, sustainable development should be understood as development based on the harmonization of social, economic and environmental subsystems, aimed at finding ways to meet the needs of present and future generations. The list of tasks includes accelerating economic growth and changing its quality; meeting the basic needs of the population; sustainable population growth; preserving and strengthening the territories' resource base, etc. [26; 27].

Having analyzed the works of the leading domestic and foreign researchers [5; 28; 29; 30; 31] the author provided a list of indicators characterizing the economic, social and environmental development, developed methodological tools for assessing the regions by means of calculating the integral indicator of sustainability. The researcher proved that regional public authorities have a wide range of methods and tools, the use of which in the practice of regional management can significantly increase the stability of regional socio-economic systems. Such tools as strategic planning of the regions' socio-economic development, public-private partnership, development of civil society, including strengthening the role of local self-government, should be top priorities [26].

Studies on regional systems stability factors

In the subsequent period, Vologda researchers focused on the study of factors and methods for improving the stability of regional socio-economic systems and individual subsystems in more details.

Given the fact that sustainable development first of all requires sustainable economic growth, this issue has become a priority in the VolRC RAS research: *T.V. Uskova (supervisor), E.V. Lukin, E.G. Leonidova, V.S. Orlova, L.V. Dubinicheva, A.S. Barabanov, O.I. Popova, T.G. Smirnova, T.V. Vorontsova, A.E. Mel'nikov*, etc[13]. The authors revealed the essence of economic growth, its theories, types and factors; analyzed the socio-economic development of Russia and its individual regions; identified the main problems, the solution of which contributes to the economic growth; assessed the factors of economic growth; defined the main directions of its intensification; offered the ways of economic growth acceleration [32; 33; 34].

In order to increase the competitiveness and sustainability of the economy, the researchers of the Center substantiated the need to solve problems that were fundamentally different from those that were solved at the stage of liberalization, privatization and raw material growth. In the most enlarged view, these tasks covered:

- stimulating production, creating and implementing a new economic policy aimed at increasing competitiveness and mutually beneficial cooperation between government and business;
- more active use of indirect impact methods related to improving the structure, increasing the volume of output and improving the industry efficiency;
- changing the vector of economic development toward a sharp increase in labor productivity and strengthening innovation processes in the production sector, using all opportunities to push innovations into practice;
- introduction of new forms and mechanisms for the implementation of the state's economic policy, including the definition of target priorities of activities, the creation of vertical corporate structures, clusters, industrial and financial groups, etc.;
- development of an institutional framework that ensures the integration of production, consolidation of market infrastructure, strengthening of professional training of enterprise managers, active dissemination of knowledge and practical experience [26].

[13] Uskova T.V., Lukin E.V. *Economic Growth: Essence, Factors, Ways of Acceleration: Study Aid*. Vologda: VolRC RAS, 2018. 140 p.; Uskova T.V., Lukin E.V., Vorontsova T.V., Smirnova T.G. *Problems of Economic Growth of the Territory: Monograph*. Vologda: ISERT RAN, 2013. 170 p.; Uskova T.V., Dubinicheva L.V., Orlova V.S. *Socio-Economic Resource of Tourism: Monograph*. Vologda: ISERT RAN, 2011. 182 p.

In subsequent works[14], the researchers of the Vologda Center thoroughly studied the factors of economic growth, primarily interregional interaction, individual branches of the regional economy, and their potential. Thus, in "Interregional Interaction as a Factor of Economic Growth", the theoretical and methodological aspects of the development of interregional economic interaction are revealed, and its influence on the growth of the regional economy is proved. The article describes the state, problems and prospects of the interregional relations development of the Vologda Oblast. The authors estimate the degree of influence of various forms of interregional interaction on economic growth in the region; substantiate the strategic directions of intensification of interregional economic cooperation [35; 36].

Given the role of agriculture and forestry in accelerating the growth of the regional economy, Vologda researchers (*T.V. Uskova, R.Yu. Selimenkov, A.N. Chekavinskii, A.N. Anishchenko*)[15] focused attention on the problems of the leading regional industrial complexes, the assumptions and resource capabilities, gave a scientific rationale for the targets and priorities of their development in the long term which included modernization of production, formation of institutional conditions for acceleration of development of scientific and technical progress, improvement of the mechanisms for managing innovation and investment activities, ensuring an increase in the level and quality of life, especially in rural areas on this basis [37; 38].

The studies of the potential of municipalities and the role of local self-government in ensuring sustainable development of the region make up a large share (*T.V. Uskova, E.A. Gutnikova, E.O. Orlova, A.N. Chekavinskii, S.A. Kozhevnikov, N.V. Voroshilov*)[16]. Besides the fact that the local government plays a significant role in improving the welfare of the population and the provision of public services, it is entrusted with the task of creating institutions aimed at increasing economic growth, ensuring their sustainability and improving the competitiveness of territories and the country as a whole [26]. Therefore, the present and future of the state literally depends on the efficiency of local self-government, as it is the local government who has the potential able to solve many of the crisis phenomena in our society and create additional incentives for the development of the Russian state [39; 40].

The authors proved that strengthening the institution of local self-government will allow solving a number of strategic tasks of the agricultural sector and creating conditions for the progressive development of the agricultural sector of the region's economy. The priority tasks included:

- restoration and modernization of the production potential of the region's agro-industrial complex;
- creating conditions for effective and sustainable development of enterprises of all forms of ownership;
- increasing competitiveness of the region's agricultural complex by improving productivity and efficiency of agricultural production on the basis of its technical re-equipment, introduction of innovative technologies, cost reduction, organization of production according to international quality standards;
- sustainable development of rural areas, improving the standard of living of the rural population and reducing its lag behind the urban one [26].

For this purpose, the staff of the Research Center organized a monitoring of the functioning of the local self-government bodies (since 2006),

[14] Uskova T.V., Lukin E.V. *Interregional Interaction as a Factor of Economic Growth: Preprint*. Vologda: ISERT RAN, 2013. 76 p.; Lukin E.V., Uskova T.V. *Interregional Economic Cooperation: Status, Problems, and Prospects*. Vologda: ISERT RAN, 2016. 148 p.

[15] Uskova T.V., Selimenkov R.Yu., Chekavinskii A.N. *The Region's Agro-Industrial Complex: Condition, Tendencies, Prospects*. Vologda: ISERT RAN, 2013. 136 p.; Selimenkov R.Yu., Sovetov P.M. *Forestry Complex: Management of Innovative Development*. Vologda: ISERT RAN, 2012. 215 p.

[16] Ilyin V.A. et al. *Local Self-Government in the Rural Area: Trends, Problems, Prospects*. Vologda: VNKTS TSEMI RAN, 2005. 196 p.; Ilyin V.A., Uskova T.V., Amelin D.E., Kol'ev A.A. *Local Self-Government on the Way to Reform*. Vologda: VNKTS TSEMI RAN, 2004. 28 p.

which allows assessing the state and the problems of this governing institution. The results of the monitoring become a good basis for finding ways to solve problems related to the transition of territories to the rails of sustainable development, as well as the ways to improve the efficiency of local self-government[17] [41; 42].

A very important factor of sustainable development is the spatial factor meaning the uniformity and connectivity of space. At the same time, the economic space of modern Russia is sparse. We make this conclusion on the basis of the study of the VolRC RAS researchers (*T.V. Uskova (supervisor), S.A. Kozhevnikov, N.V. Voroshilov, I.A. Sekushina, S.S. Patrakova*)[18] who showed that in the Russian Federation, as well as in the whole world, economic development is increasingly concentrated in agglomerations – megacities, the large and largest cities, i.e. the territories that are simultaneously the centers of knowledge production and innovation, financial, management and logistics centers, transport hubs and large consumer markets. They also increasingly concentrate the production of goods and services which pull together the financial and labor resources from other territories. These processes are becoming more and more stable. As a result, the socio-economic problems of territories that are not included into agglomerations are aggravated [43].

The problem of intraregional differentiation is discussed in great detail in the monograph [44]. It considers the theoretical and methodological aspects of the study of intraregional differentiation, structures the factors that determine the socio-economic differences of municipalities, and suggests a methodological approach to a comprehensive assessment of the studied process. Based on the case of the Vologda Oblast, the authors studied the trends and factors of differentiation of the municipal and urban districts for the period of 1991–2015, presented a typology of municipalities by their development level, and evaluated the effectiveness of regional policy for the municipal entities development. The researchers developed a scientific and methodological approach to the regulation of intraregional differentiation, aimed at creating conditions for reducing its scale and overcoming its negative consequences.

Vologda scientists have repeatedly stressed that the high level of territories' differentiation is caused not only by the objective factors, but it is a consequence of the implemented socio-economic policy. The research works proved that it is possible to ensure a balanced development of all territories by adjusting the implemented socio-economic policy. Its main goal should be creating the most favorable conditions for the development of the economy and social sphere of municipalities by attracting private investment and improving the quality and availability of budget and municipal services. This requires the following measures:

– stimulating economic development by creating new growth points in the regions based on competitive advantages;

– coordinating infrastructure investments of the state and investment strategies of business, taking into account the priorities of spatial development and resource constraints;

– reducing the differentiation in the level and quality of people's life in every municipality by means of the effective mechanisms of social and budgetary policy ensuring the growth of human potential [45].

The issue of the budget and tax policy imperfection has been acute for more than two decades. The research works on the problems of budget policy and intergovernmental relations produced by the staff of the Research Center

[17] Uskova T.V., Voroshilov N.V., Gutnikova E.A., Kozhevnikov S.A. *Socio-Economic Problems of Local Territories: Monograph*. Vologda: ISERT RAN, 2013. 196 p.; Chekavinskii A.N., Kozhevnikov S.A., Voroshilov N.V. *Institutes of Development at the Local Level*. Vologda: ISERT RAN, 2017. 200 p.

[18] Uskova T.V. The potential of Russian territories' development. *Problems of Territory's Development,* 2018, no. 5 (97), pp. 7–17. DOI: 10.15838/ptd.2018.5.97.1; Voroshilov N.V., Gubanova E.S. *Intraregional Socio-Economic Differentiation: Monograph*. Vologda: VolNTS RAN, 2019. 187 p.; Uskova T.V., Voroshilov N.V. *Regional Policy of Territorial Development: Monograph*. Vologda: ISERT RAN, 2015. 156 p.

(*M.A. Pechenskaya-Polishchuk, A.I. Povarova, A.V. Galukhin, K.A. Miklyaeva*)[19] convincingly proved that the government's fiscal policy aims not at actual but only at formal goals of economic growth support. The quintessence of the fiscal policy was its stabilization which led to severe fiscal austerity to the detriment of the territories' economic interests which creates the risk of prolonged stagnation for the domestic economy. The reasons for this situation should be sought in the inefficiency of public policy. After all the reformation changes, it was not possible to develop a scientifically sound and practically effective budget policy [46]. A high level of territories' differentiation, budget deficit, low potential of municipalities, especially at the settlement level is the result of such a policy. The vast majority of the municipalities do not have funds for development. The inter-budgetary reform did not solve the problem of reducing the local budgets' dependence on the financial assistance from higher-level budgets. The revenue base of the municipalities has narrowed. At the same time, local governments are extremely limited in their ability to influence its expansion. The mechanism for generating local budget revenues does not fully operate to expand the volume and improve the quality of municipal services to the population. Consequently, the current situation does not contribute to the economic development of most municipalities, the growth of the quality of life of the population, and the overcoming of the welfare mentality [47; 48].

It is possible to change the situation by conducting a gradual decen-tralization of income sources based on joint decisions and coordinated actions of all levels of government. This can only be achieved by strengthening the territories' economic growth and economic potential which will allow them to reach a new level of independence. While the transfer of taxes to the local level will encourage municipalities to develop their own tax base and expand the areas of advanced development [49].

Stimulating inter-municipal cooperation, strengthening financial, economic, socio-cultural, organizational, managerial and other ties between small and medium-sized cities and rural settlements, and developing social and engineering infrastructure are very important for solving the problems of territories and their transition to a model of sustainable development [43].

Therefore, creating conditions for territories' self-development by adjusting the regional socio-economic policy, strengthening the financial – and economic foundations and improving the regulatory framework of local self-government, increasing the effectiveness of interaction between state authorities and local self-government, expanding the list of tools to promote the development of the territories' potential are the most important tasks of state authorities [27], since sustainable development of territories is the key to the stability of the region as a whole.

In the context of a lack of budget resources for the development of municipalities and the region, it is fundamentally important to attract the resources of economic entities for these purposes, and therefore the study of interaction forms between government and business has become very relevant in the transformational period.

As we have already emphasized, the development of public-private (private-municipal) partnerships can increase the stability of regional socio-economic systems. These tools of state and municipal management have not been ignored by Vologda researchers for many years. The first research works on this topic were carried out in the early 2000s.

The paper by *V.A. Ilyin (supervisor), T.V. Uskova, D.E. Amelin, D.P. Zharavin* [50] describes the content and forms of interaction between the public and private sectors of the

[19] Pechenskaya M.A., Povarova A.I. *Regional Budgets: Trends, State, Prospects: Monograph*. Ed. by V.A. Ilyin. Vologda: ISERT RAN, 2016. 110 p.; Povarova A.I. *Methods of Increasing the Budget Security of the Region: Preprint*. Vologda, 2011. 40 p.; Pechenskaya M.A. Budget potential of municipal entities: assessment and directions for development (on the example of Vologda Oblast). *Studies on Russian Economic Development,* 2019, no. 4. pp. 120–131; Pechenskaya M.A., Uskova T.V. Topical issues of the improvement of intergovernmental dealings in the system of local government. *Economic and Social Changes: Facts, Trends, Forecast,* 2012, no. 1 (19), pp. 136–146.

economy at the municipal level[20]. Methodological approaches and methodological tools for organizing cooperation between local governments and businesses are considered in the case of Vologda. Later, the researches deepened and revealed the mechanisms of interaction between local self-government bodies of the city and economic entities[21].

In later works the VolRC RAS researchers (*S.A. Kozhevnikov*)[22] considered the essence, features, institutional and economic aspects of public-private partnership in such an infrastructure sphere as housing and communal services. The monograph summarized the foreign and domestic experience of public-private partnership in this area; determined the economic prerequisites and institutional and legal features of the implementation of the partnership between government and business. The author substantiated the necessity of developing and adopting a concept for the public-private partnership development, which would formalize the main forms and principles of joint projects, determine the directions of state policy for the partnership development, provide for the introduction of a new mechanism for managing housing and communal services facilities and the development of a new model for PPP projects financing [51].

In the conditions of weak financial and economic opportunities of the authorities, for the territories' sustainable development it is necessary to consolidate the resources of the government and business on the principles of social responsibility. This problem is also reflected in the works of VolRC RAS researchers (*V.A. Ilyin, A.I. Povarova, M.F. Sychev, T.V. Uskova, E.D. Kopytova*)[23]. The resources of business structures can be invested in the development of public infrastructure, solving specific socio-economic problems, expanding the range and improving the quality of services, forming new growth points that contribute to increasing the sustainability of the region's socio-economic development [52].

Large corporations significantly affect territories' development. However, having analyzed the results of the production and financial activities of the largest ferrous metallurgy enterprises the researchers concluded that significant cash flows went past the budget. This is not in the interests of the state and society. In many ways, this situation is the result of the fact that Russia's state authorities have not yet created effective mechanisms to counter the oligarchs' dominance in the economy. As a result, the conflict between their interests and the interests of society is still not regulated by the law. This problem has a painful effect on the level of budget profitability, solving the problems of national and regional development, becomes a source of tension in society and does not allow moving towards a socially just state. The authors believe that the resolution of the conflict can primarily be found in a radical change in the paradigm of socio-economic policy and its reorientation to the needs of the majority of the population, the development of social responsibility of business [53; 54].

[20] Ilyin V.A., Uskova T.V., Amelin D.E., Zharavin D.P. *Local Self-Government: Interaction of Government and Business: Study Aid*. Vologda: VNKTS TSEMI RAN, 2006. 92 p.

[21] *Development of Mechanisms of Interaction of Local Self-Government Bodies of the Town and Economic Entities: Final Research Report.* Executed by V.A. Ilyin, T.V. Uskova, E.O. Orlova, M.A. Dubinin. Vologda, 2007. 77 p.; *Specifics of the Relationship between Municipal Authorities and Private Business in the District: Informational and Analytical Note on the Research*. Executed by T.V. Uskova, E.O. Orlova, M.A. Dubinin. Vologda, 2007. 51 p.

[22] Kozhevnikov S.A., Uskova T.V. *Public-Private Partnership in the Housing and Communal Services of the Region: Problems and Prospects of Development: Monograph*. Vologda: ISERT RAN, 2016. 148 p.

[23] Kopytova E.D. Corporate social responsibility: assessment methods and the regional dimension. *Economic and Social Changes: Facts, Trends, Forecast,* 2017, vol. 10, no. 1, pp. 254–271. DOI: 10.15838/esc/2017.1.49.14; Ilyin V.A., Povarova A.I., Sychev M.F. *Influence of Metallurgical Corporations Owners' Interests on Socio-Economic Development: Preprint*. Vologda: ISERT RAN, 2012. 104 p.; Ilyin V.A., Povarova A.I. *The Largest Metallurgical Corporations and Their Role in the Formation of Budget Revenues*. Vologda: VolRC RAS, 2019. 204 p.; Uskova T.V., Kopytova E.D. Corporate social responsibility current state and development tools. *Problems of Territory's Development,* 2016, no. 6 (86), pp. 7–19; Kopytova E.D. *Corporate Social Responsibility: Problems and Prospects of Development: Monograph*. Vologda: VolRC RAS, 2017. 174 p.; Kopytova E.D. Revisiting the development of cooperation between the state, business, and society in addressing territorial development issues. *Economic and Social Changes: Facts, Trends, Forecast,* 2017, vol. 10, no. 5, pp. 197–215. DOI: 10.15838/esc/2017.5.53.14

The Center's researchers emphasize in their works that the formation of the ideology of social responsibility of business involves the popularization and promotion of corporate social responsibility, as well as the provision of methodological support to socially responsible organizations. The authors proposed a set of measures aimed at the development of corporate social responsibility, including: organization of educational events, exhibitions and fairs of social projects, information support in local media, holding a competition for the best socially responsible organization, assigning the name of a social partner to new social objects, developing a special certificate permitting the right to place it on their products, etc. [55; 56]. The authors also note that it is impossible to intensify this process without increasing the state's role in establishing partnership between government, business structures and the population and ensuring a balance of their interests. This is the interaction that has a significant potential, the use of which will give a synergistic effect for the socio-economic development of Russian territories [57].

Strategic planning as the main tool for the region's sustainable development management

The leading Russian and foreign scientists give priority to strategic planning among all the tools for managing the region's sustainable socio-economic development, as far as it is designed to determine strategic (long-term) and current development goals, and develop a system of planning documents that ensure the implementation of these goals. The thesis about the priority of strategy over tactics is fully confirmed by world practice. The stability of the regional socio-economic system and, as a result, the well-being of the population depend on how well strategic tasks are set and structured, how efficiently resources are used to solve them, and how consistent the planned activities are [26].

The need to use this tool for managing socio-economic processes in regional practice was justified by the VolRC RAS researchers from the first days of the institution's operation. This is evidenced by one of the first research works carried out under the supervision of *Doctor of Sciences (Economics) V.A. Ilyin*[24]. During this period, the concepts of socio-economic development of several region's municipalities were also developed[25]. However, the scientific foundations of strategic planning were created later, taking into account the works of I.Ya. Blekhtsin[26], A.L. Gaponenko [58], B.M. Grinchel, N.E. Kostyleva [59], K.V. Kolomiychenko, V.E. Rokhchin [60], etc. They were presented in the work [61], carried out under the supervision of V.A. Ilyin[27]. Based on this work, in the early 2000s, the Vologda researchers developed a strategy for the region's development[28]. The research revealed the region's potential for moving to the dynamic and sustainable socio-economic development. The authors justified the strategic goal, the tasks and priority areas, including the optimization of the industrial structure in favor of socially oriented industries and the rapid growth of industries with high added value, the transition of agriculture to the rails of intensification, the development of production infrastructure, the activation of investment and innovation activities, the development of science and the introduction of scientific and technological progress in production.

[24] *Prospects of Socio-Economic Development of the Vologda Oblast in the Conditions of Transition to a Market Economy: Interim Research Report.* Executed by V.A. Ilyin, A.A. Pashko, P.M. Sovetov, M.F. Sychev. Vologda, 1992. 150 p.

[25] *The Concept of Socio-Economic Development of the Regional Center – Vologda during the Transition to Market Relations. Stage 2: Research Report.* Executed by V.A. Ilyin, I.L. Brauze, D.N. Bystrov, A.A. Pashko. Vologda, 1996. 175 p.; *The Concept of Socio-Economic Development of the Cherepovets District before 2002: Inf.-Analyt. Note on the Research.* Executed by P.M. Sovetov, M.F. Sychev, A.A. Pashko, V.A. Ilyin, A.S. Shulev. Vologda, 1999. 30 p.; *Main Directions of Socio-Economic Development of the Vytegorsky District for the Period before 2002: Inform.-Analyt. Note on the Research.* Executed by A.S. Shulev, V.A. Ilyin, M.M. Polyakov, N.A. Smirnova. Vologda, 1999. 38 p.; *Main Directions of the Concept of Socio-Economic Development of Vologda: Interim Research Report.* Executed by A.N. Zuev, T.V. Uskova. Vologda, 2000. 75 p.

[26] Blekhtsin I.Ya. *Strategy of Sustainable Development of Regional Systems: Preprint.* St. Petersburg: IRE RAS, 2001. 13 p.

[27] Uskova T.V. *Indicative Planning: a Monographic Study Based on the Materials of the City of Vologda.* Under the supervision of Doctor of Sciences (Economics), Prof. V.A. Ilyin. Vologda: VNKTS TSEMI RAN, 2003. 159 p.

[28] *Strategy for the Region's Development.* Coll. auth. under the supervision of Doctor of Sciences (Economics), Prof. V.A. Ilyin. Vologda: VNKTS TSEMI RAN, 2004. 228 p.

The researchers emphasized that the region's development strategy should connect the target programs, adopted by the executive and representative authorities, on certain problems of regional development with each other (in terms of resources, deadlines, and other parameters). Moreover, it is the authorities, who primarily needed such a strategic document, because the presence of a strategy will help clarify the ongoing socio-economic policy, implement strategic and spatial planning, develop infrastructure, and create incentives for business and motivation to work. The second destination is business. Clearly defined development goals and guidelines will allow business structures to see the prospects of the economy and the industries, and make their plans in accordance with them. It should be noted that territorial planning in market conditions does not limit the economic freedom of business entities, since the parameters of plans are not directive, but are indicative, advisory in nature. At the same time, the plans for socio-economic development of regions, enterprises, and firms should be formed in the outline of the development concept of the Russian Federation, which ensures the unity of the economic space. The final addressee of the Strategy is the population, which are to get a concrete idea of what they should await in terms of living conditions in a few years. The document's social orientation is to help to form a constructive ideological position of citizens, contribute to their consolidation and strengthening the political stability [62].

Later, the researchers proposed a significantly updated regional strategy for economic growth[29]. The authors emphasized that in modern conditions "… a breakthrough in improving production efficiency is achieved by a new quality of economic growth. The essence of this process is to accelerate the pace of scientific and technological progress, enhance innovation, expand the use of the knowledge economy, and improve the social organization and management of society". The new version of the strategy significantly expands the time and content horizons. Considerable attention is paid to the theoretical aspects of economic growth based on innovation. The researchers assessed comprehensively the region's scientific and technical potential, presented the strategic aspects of the investment process intensification, improvement of timber processing, machine-building and agroindustrial complexes efficiency; proposed the measures to solve social problems, assessed the need for financial resources for the implementation of strategic objectives, grounded the mechanisms and methods of effective management of regional development. They noted that when implementing the strategic objectives of economic growth, priority should be given to increasing labor productivity and improving the quality of labor capital. It is a person with his or her knowledge and experience embodied in new technologies, who is able to provide a new quality of economic growth. The importance of creating a rational system for managing the implementation of strategic tasks, which should be based on the mechanisms of interaction between government bodies, business and the population, was emphasized. The authors point out that it is necessary to introduce technologies based on the extensive use of information and communication technologies into the practice of regional management. Special attention was paid to linking the direction of the region's development with the basic provisions of national documents of a strategic nature – the messages of the President of the Russian Federation to the Federal Assembly, program resolutions of the Government of the Russian Federation, decisions of regional public authorities [63].

The methodology of strategic planning was formed later [26]. The most important principles which were paid much attention to are scientific and purposeful character, social orientation, complexity, adaptability. The authors proposed an algorithm for the development and implementation of the strategy, methodological tools for selecting strategic goals and justifying development priorities, and revealed the mechanism for their implementation. The priority place in it was given to the system of continuous planning and project management.

[29] *Regional Strategy for Economic Growth – 2015.* Ed. by V.A. Ilyin; VNKTS TSEMI RAN. Moscow: Nauka, 2007. 244 p.

The created methodology of strategic planning of the region's socio-economic development became the foundation for the development of strategies for the development of municipalities and individual sectors of the regional and municipal economy prepared by the Vologda researchers. They have played an important role in improving the sustainability of the territories.

Instead of conclusion. Prospects for the study of the region's sustainable development

The current understanding of sustainable development is much broader than its original interpretation. The Russian Federation and the world community as a whole are at the very first stage of transition to sustainable development. As the leading domestic experts in this field rightly note [64; 65], the enduring importance and role of the concept of sustainable development for world development remain. However, due to the emerging new challenges and the increasing influence of factors that have become a consequence, first of all, of scientific and technological progress, researchers face the task of further developing the methodology of sustainable development, finding ways to achieve it at the regional, national and global levels.

In this regard, given the complexity of the problem of sustainable development, its relevance for the Russian Federation and the regions, it is necessary to set the task of deepening scientific research, significantly expanding the range of issues that require the organization of scientific research. It is important to further develop the theoretical and methodological foundations of sustainable development; to study not only economic, but also social, environmental, managerial, and organizational factors of sustainability in more details, taking into account the Russian specifics, and improving the efficiency of their use. "When choosing the way to the future, Russia should take into account both global trends and the peculiarities of its own experience and geopolitical position, resource and environmental reserves, traditions and spiritual world of the population" [11]. The issues of state management of sustainable development, improving its effectiveness should also be studied, since the sustainable development goals presented in the Agenda[30] are reflected in the program and planning documents adopted at the federal level. We believe that Vologda researchers will contribute to solving these problems.

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Received December 01, 2020.

Editorial

DOI: 10.15838/esc.2020.6.72.2
UDC 323.2; LBC 60.527

Russian Statehood in the Face of the "Corruption of the Elites" Threat

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Abstract. The article is the final part of the series of publications "From the Editor-in-Chief", published in 2020 in the journal "Economic and Social Changes: Facts, Trends, Forecast". Its central problem is the unsatisfactory quality of the ruling elites in Russia which, for almost the entire post-Soviet period, has been the main problem of stalling reforms and achievement of national development goals. The authors analyze the causes of this phenomenon; provide expert assessments and statistical data that allow us to assess the current state of the ruling elites in the country. The article examines the trends of public sentiment as an indicator of the negative consequences of the public administration inefficiency and the unrealization of social expectations from the government and from the President personally. We pay special attention to the content and results of the anti-corruption campaign initiated by the President of the Russian Federation in the mid-2010s. For this purpose, we analyze data of monthly reports of the Ministry of Internal Affairs of the Russian Federation on the state of crime in the Russian Federation

For citation: Ilyin V.A., Morev M.V. Russian statehood in the face of the "corruption of the elites" threat. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 24–53. DOI: 10.15838/esc.2020.6.72.2

for the period from 2003 to October 2020, statistics of the Judicial Department at the Supreme Court of the Russian Federation on the state of criminal records in Russia for the period from 2012 to the first half of 2020, materials of mass media, and opinions of experts. The authors come to the conclusion that it is necessary to move from episodic, or "demonstrative", criminal cases with a common motive being an internal political processes to systematic preventive work on the nationalization of the ruling elites. Its purpose is not to maintain a balance of interests within the elite groups but to solve the key tasks of national development: achieving social justice, reducing inequality, dynamic growth in the level of income and quality of life of the population. This approach mostly corresponds to the new socially oriented Constitution of 2020, and, ultimately, it allows hoping for the solution of many problems in the system of state administration, as well as for the development of Russian statehood in the civilizational and historical context.

Key words: ruling elites, oligarchic capitalism, corruption, efficiency of public administration, national development goals, President of the Russian Federation, society.

The presented article concludes the series of publications "Editorial" which started in February 2020[1]. Its distinctive feature includes two factors.

First, the specifics of our time. **It is not just about the global pandemic**, which deepens many acute problems of world civilization and continues to have an impact on nearly all aspects of individual and social life, but **features of Russia's electoral cycle facing an issue of V.V. Putin's conclusion of presidential terms for the first time over the past 20 years.** Considering his special role in the contemporary history, public assessments, and the current governance system, it definitely led to particular consequences: the system of public administration "was set in motion", and the President, who has always been a chief arbitrator and a balance of interests in it, started to lose control over the patriotic and liberal coalitions[2].

The second aspect, uniting the "Editorial" publications into a separate series in 2020, is a special attention of authors **to social and political life within the RF Constitution's changes which came into force after the all-Russian vote on July 1, 2020**. The content meaning of amendments, their discussion in the expert community, the reaction of large groups of population, and final results of people's will expression, which became known in early July, has been analyzed by us since the President's initiation of changes to the Basic Law on January 15, 2020 during his annual Address to the Federal Assembly.

Let us briefly overview the algorithm of expressing the main idea of the whole series.

The first article "Another Step toward V. Putin's "Long State"" *(Economic and Social Changes: Facts, Trends, Forecast, 2020, vol. 13, no. 1, pp. 9–33)* was about the analysis of the President's initiatives, announced at the Address to the RF Federal Assembly (January 15, 2020). Then, significant personnel changes occurred at the Russian Government (in particular, the replacement of the Chairman of the Cabinet of Ministers), and society began to prepare for amending the country's Basic Law – the RF Constitution.

The content of **the second article "Efficiency of the State's "Manual" Management. Challenges of 2020"** (*Economic and Social Changes:*

[1] Ilyin V.A., Morev M.V. Another Step toward V. Putin's "Long State". *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 1, pp. 9–33.

[2] Prokhanov A. I see Putin's problems, his drama. *Zavtra*, 2020, October 13. Available at: https://zavtra.ru/blogs/ya_vizhu_problemi_putina_ego_dramu

Facts, Trends, Forecast, 2020, vol. 13, no. 2, pp. 9–24) was mostly defined by the "first wave" of the epidemiological crisis which Russia and most countries faced in February–March 2020. We understood "challenges" as trials far beyond issues of healthcare and preservation of people. We put the emphasis on the fact that a real "challenge" will begin **after** an acute phase of the epidemiological crisis, because the global pandemic, announced by the World Health Organization on March 11, 2020, systematically changed lifestyles of each individual, strategies of conducting state policies in most countries, and principles of the world civilization's organization.

The third article "Vote of Confidence for the President is Confirmed. Achievement of Socio-Economic Development Goals before 2024–2030 is Uncertain" *(Economic and Social Changes: Facts, Trends, Forecast, 2020, vol. 13, no. 4, pp. 9–37)* discussed the analysis of the results of the all-Russian vote on amendments to the Constitution, conducted on July 1, 2020. We provided factual data and expert assessments that prove that, despite the support of the majority of Russians for the proposed changes, the President failed to reach a public consensus around the new Constitution.

In the fourth article "Announced in 2018, V. Putin's "Decisive Breakthrough" is Now Stuck" *(Economic and Social Changes: Facts, Trends, Forecast, 2020, vol. 13, no. 5, pp. 22–54),* we reviewed constitutional amendments from the civilizational and historical point of view – as a stage of a multi-year process of building the new post-Soviet statehood, initiated by the President in 1999 and implanted through his direct initiatives (the "Munich Speech" of 2007, the "Valdai Speech of 2011, the inclusion of the Crimea and Sevastopol into the Russian Federation (2014), the "breakthrough development idea" (2018), and amendments to the Constitution (2020)).

On the basis of expert assessment, statistical data, and multi-year sociological measurements of public opinion, we concluded that **this historical sequential process began to stall after the Russian society ceased to feel real changes in the dynamics of the level and quality of life promised by the President in 2012 (it should have happened in 2018[3], but it got delayed until 2018–2024[4] and then until 2030[5]).**

As a result, V.V. Putin's initiative to change the RF Constitution did not become the motivator of social consolidation and spiritual impulse (unlike, for instance, "Crimean Spring" events). Although it corresponded to expectations of citizens regarding strengthening of the welfare state foundations.

In the fifth and final part of the series, which was named "Russian Statehood in the Face of the "Corruption of the Elites" Threat", we decided to search for an answer for the question regarding a reason of the long-term stalling of the implementation of national development goals and the President's main initiatives.

Using the phrase "corruption of the elites", we refer to the quote of S.E. Kurginyan – one of the most famous Russian political scientists who specializes in domestic history. He understands the "corruption" as a situation when the elites literally "turn their backs" on the head of the state together with national and patriotic values in the crisis period for the country.

[3] On measures to implement state social policy: Executive Order of the President of the Russian Federation no.597, dated May 7, 2012. *Official website of the President of Russia*. Available at: http://www.kremlin.ru/acts/bank/35261

[4] On national goals and strategic objectives of the Russian Federation through to 2024: Executive Order of the President of the Russian Federation no. 204, dated May 7, 2018. *Official website of the President of Russia*. Available at: http://www.kremlin.ru/acts/bank/43027

[5] On the national development goals of the Russian Federation through 2030: Executive Order of the President of the Rusi sian Federation no. 474, dated July 21, 2020. *Official website of the President of Russia*. Available at: http://www.kremlin.ru/acts/bank/45726

"In 1991, it turned out that there are no even 500 thousand of people ready to fight for the USSR among 10-million CPSU. Not even 500 thousand! **All elites, corrupted, run to banks and firms, and this is how it ended.** The same happened in February 1917. It appeared only two people among the elites can support the Tsar – count Keller and Khan Nakhchivanski. All the others randomly spread like cockroaches. **This is called "the corruption"**[6].

We put broader meaning into the wording "corruption of the elites" and use it for uniting several other problematic moments with which S.E. Kurginyan has been characterizing current Russian elites over the last 12 years. It is not just about the elites' behavior in a crisis but their continuing support for the comprador idea during the post-Soviet period. "Representatives of domestic elite circles perceive the country they live in solely as a source of income"[7]. It is also about "current elites balancing between the westernism and the statehood and trying to combine something increasingly incongruous"[8].

Thus, the final article in the series focuses on the country's current elites, their moral qualities and priorities (as we mentioned in the previous article) which are the main reason of stalling national development objectives and, in particular, aims of national projects: ensuring sustainable natural growth of the RF population, increasing life expectancy, providing sustainable growth of citizens' real incomes, as well as the level of pension provision, reducing poverty, improving housing conditions[9], and many others.

While analyzing the ruling elites[10], we discuss people who possess wealth, power, and, most importantly, participate in government processes directly or indirectly. It is about three types of ruling elites[11]:

- ✓ political elites, representing the federal level of the public administration system;
- ✓ bureaucratic (or administrative) elites, representing regional and municipal levels of governance which, together with the federal level, form a united system of "public power"[12];

[6] Kurginyan S.E. Political elites in modern Russia: Current challenges. Speech at the round table "Elites in Modern Russia" (Center for Conservative Studies at the Faculty of Sociology of the LMSU, October 24, 2008). Available at: http://www.kurginyan.ru/publ.shtml?cmd=art&auth=10&theme=&id=2161

[7] Kurginyan: The elite will run away in a crisis. *"Deita" Information Agency.* November 12, 2020. Available at: https://deita.ru/article/485669

[8] Kurginyan on the inevitable political split of the Russian elite. *Sut' Vremeni (Meaning of Time)*. June 10, 2013. Available at: https://eot.su/RedSenses/section/elita

[9] On national goals and strategic objectives of the Russian Federation through to 2024: Executive Order of the President of the Russian Federation no. 204, dated May 7, 2018. Official website of the President of Russia. Available at: http://www.kremlin.ru/acts/bank/43027.

[10] "They [the elite] form a more or less compact social and psychological entity; they have become self-conscious members of a social class". It includes various groups that are directly or indirectly involved in power processes: economic, cultural, ideological, scientific, military, and political elites (Source: Mills R. *The Power Elite*. Transl. from English by E.I. Rozental', L.G. Roshal', V.L. Kon. Moscow: Inostrannaya literatura, 1959. 542 p.).

[11] **The political elite** manages political activities of the state: it includes political leaders, heads of the most authoritative parties and movements in the country. The economic elite is represented by large owners, bankers, heads of major organizations, and active participants in the country's capitalization. It is designed to manage the country's economy. **The military elite** is a group of people in senior military positions who organize the country's defense policy**. The bureaucratic elite** is a system of officials who make political decisions within the state. A striking example of it is the modern top of the Russian State Duma: the vast majority of its members belong to the United Russia party, which is also the political elite of the state. **The cultural and information elite** is represented by the most reputable figures of science, culture, and religion. This is a very important type of elite, as it has a huge impact on the formation of the country's public opinion and ideology (Source: Amurov M.A. The classification of contemporary political elites. *Administrative Consulting*, 2020, no. 5, p. 24).

[12] RF Constitution with amendments of 2020. Article 132. Official website of the State Duma of the Russian Federation. Available at: http://duma.gov.ru/news/48953/

✓ economic elites, mostly consisting of owners of big capital, banks, corporations, etc. (according to experts, "currently, it is difficult to draw the line between political and economic elites, because many modern politicians, one way or another, possess big financial capital and participate in the country's economic life"[13].

Mismatch of aforementioned groups' interests to national development goals is, in general, a global problem. Discussing the quality of modern elites, experts note: "Governments mostly consist of people who are not always capable of understanding and accepting deep thoughts and ideas, many of which are about the prospects – not immediate circumstances. Politicians will not succeed in improving society and people due, first of all, to their insatiable hunger for power, which often becomes irrational. Moreover, they deform and turn into dangerous people after getting it"[15].

A special nature of the ruling elites' role, "slowing down" the national development, is mostly instrumental in the 21st century. It is about an unprecedented growth of information technologies and opportunities for remote communication. Because of it, representors of global capital (as globalism adepts) not just receive increased opportunities for promoting their ideas and achieving financial goals, but

"The possibilities of elitism clearly tend to decrease in quantitative and qualitative aspects: wealth, money, and the power over other people, based on it, remain. **This kind of elite with emasculated content is a pseudo-elite, or quasi-elite. It does not have the qualities of genuine leadership, and, therefore, it is not capable of leading society on the path of improvement. It is successful only in manipulating society: it develops more sophisticated technologies for this. Society cannot be satisfied with the result of such work, because the quasi-elite does not give people an idea of the future.**

Well-being and success; comfort and wealth are only prerequisites for the future, which, by the way, may not come within fierce competition and tangible limitations of material goods. We are more and more afraid of such future"[14].

S. Belkovskii: **"Loans for shares scheme is not a mistake, because it was done deliberately.** It was a free distribution of state property into the hands of certain individuals...»

Yu. Boldyrev: **"It is certainly a crime, and a deliberate, purposeful crime is worse than any mistakes. Mistakes can be corrected. Crimes are harder to fix, especially after a quarter of a century ...** A team came to power with a goal: personal enrichment, the creation of a clan that will continue to hold power in any way ...»

V. Inozemtsev: "Economically, we created a structure that **practically eliminated a possibility of additional competition.** Now a lot of people write about how many businesses died in the 90s. In the 2000s... Therefore, we have not actually seen the industrial development that took place in Eastern and Central Europe after the communist period, let alone China and the economy of East Asia. In fact, **we have completely set ourselves a barrier to go beyond the production activity of the Soviet period and even much lower in many industries today, and there will be no more"**[16].

[13] Amurov M.A. The classification of contemporary political elites. *Administrative Consulting*, 2020, no. 5, p. 24).

[14] Zinnurova L.I. The problem of the elite at the contemporary society. *Scientific Notes of Taurida National V.I. Vernadsky University. Series: Philosophy. Culturology. Political sciences. Sociology*, 2010, vol. 23 (62), no. 1, pp. 147–148..

[15] *Ibidem*. P. 145.

[16] Duscission "Loans for shares scheme: How to fix the mistakes of the 90s?". Ekho Moskvy, November 26, 2020. Available at: https://echo.msk.ru/programs/exit/2747648-echo/

they become dominant – a subject defining the global development vector and capable of influencing any state's policy directly or indirectly. In fact, to resist this force is to defend national, not global, interests (especially when the Internet is available in each house), and it is possible only through strict nationally-oriented policy, some "closure", and tough political decisions (like in China for instance).

It is practically impossible to do in modern Russia, because a large part of the existing governance system was formed in the 1990s, when the USSR collapse caused the emergence of "phantom"[17] personalities and "phantom" ideology in the national public administration system.

In the 1990s, the system of "oligarchic capitalism"[18] formed in Russia, and it became unique: we discussed it in our previous article[19]. Russia, being a successor of the Soviet Union, began building the capitalism, and its course turned 180 degrees in policy, economy, socio-cultural context, lifestyle and thoughts of most Russians. Despite a formally remaining record about a "welfare state", Piketty's 2017 study on income inequality showed that "all positive achievements of the 1917 Russian Revolution has been liquidated" over 25 years of Russia's existence[20].

"There are no countries, where a socialist revolution took place, which returned to their pre-revolutionary past and proclaimed construction of capitalism as a goal. In addition to China, these are Vietnam, Laos, and Cuba. They develop according to the Chinese model, build a multi-layered economy: some more successfully and some less; **they do not deny socialism but give it a new reading…**

Only Russia, which had paid so much in the struggle for socialism, returned to the capitalism of initial accumulation, burdened with numerous vices. Those countries went forward, and we went back…

If it is true that a basis forms a superstructure, then it is difficult to expect that the elite of such a country is able to develop an optimal model of social development. Therefore, it is pointless to ask what we are building and where we are going. We are going with the flow. At the same time, we look more into the past than into the future"[21].

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[17] The term "phantoms" is used in Zh.T. Toschenko interpretation as "phenomena that represent specific, sometimes abnormal, extravagant forms of social (public) activity that have a serious impact on political, economic, and social processes. Carriers of these forms of activity have hypertrophied social characteristics (excessive thirst for power, unlimited desire to possess wealth, sick desire for fame). In combination with personal socio-psychological characteristics, they represent a very specific number of political and public figures, representatives of financial and oligarchic circles, whose appearance became possible in the modern critical era of Russia's life, within radical political and economic transformations...

A phantom in the ideology of the new Russian state is also traced quite clearly... Contradictions between the realities of life and the "best" concepts give rise to phantoms of an ideological nature" (source: Toschenko Zh.T. Phantoms of Contemporary Russian Society. *Humanities of the South of Russia,* 2016, no. 1, p. 12).

[18] On August 31, 1995, B. Yeltsin issued the Order no. 889 "On transferring federally-owned share in pledge in 1995". Thus, a legal "cover-up" for loans for shares scheme was carried out: as a result, "with nearly zero costs, the oligarchs acquired property worth at least 40 billion dollars". Experts called it "an unprecedented fraud..." (Source: Dobren'kov V.I., Ispravnikova N.R. The The Russian version of "capitalism for the few": Is there a way out of the impasse? *Moscow State University Bulletin. Series 18. Sociology and Political Science*, 2013, no. 3, p. 30).

[19] Ilyin V.A. Development of civil society in Russia in conditions of "capitalism for the few". *Economic and Social Changes: Facts, Trends, Forecast*, 2017, vol. 10, no. 4, pp. 9–40.

[20] Novokmet F., Piketty T., Zucman G. *From soviets to oligarchs: Inequality and property in Russia, 1905–2016.* National Bureau of Economic Research. Cambridge, MA. August, 2017.

[21] Kiva A. Dislocated reforms. The country should look into the future, not the past. *Nezavisimaya Gazeta*, September 16, 2020.

This is confirmed by current studies of sociologists who state that the need for social justice for contemporary Russian society is equal to the basic needs for food and health according to Maslow's hierarchy of needs[22].

Some experts positively assess the fact that contemporary Russian society consolidated around national interests and values of a welfare state (which is the basis of the new RF Constitution of 2020). It is difficult to disagree with, but we need to understand that society's social consolidation is based not on social justice itself, which should be a foundation of the law system, distribution of national income, and other aspects of public administration. Instead, it is based on the "deficit" of social justice in real life and its declarative existence.

"…attempts to revise the results of privatization will encounter many restrictions related to **a dominant role of "crony capitalism" in the Russian economy.**

The institute of illegitimate property in such conditions ensures the reproduction of corrupt power relations of a limited group of people – not sustainable long-term socio-economic development, economic growth, and economic modernization…

"Crony capitalism" in modern Russia developed **a certain system of basic values**. This system can be rightfully called anti-national"[23].

"There are two types of capitalism today: free market capitalism with fair competition, and a state-powered economy with unfair competition. The latter is also referred to as "crony capitalism". Crony capitalism has been spreading in most developing countries and is the reason why the reputation of the free market economy is being damaged.

Crony capitalism means that the government or the authorities provide an unfair advantage to their close companions, including family members, friends, and associates, and eventually establish a monopoly in a given industry. This type of unfair advantage is given in the form of granting soft loans, issuing special permits, or restricting other companies from taking part in specific activities. It is not viewed as corruption because such decisions are made within legal boundaries. That's why it is often labelled to as "legalised theft".

The term "crony capitalism" was first coined during the Asian financial crisis in 1997–1998. University of California professor Andrew MacIntyre explained that the underlying cause of the crisis was crony capitalism, using the examples of Indonesia and Thailand. The crisis hit many Southeast Asian countries and was triggered by massive inflows of "hot money" intended to generate short-term profits based on interest rate differences. This inflow of foreign capital and movement of money was carried out by governments who did it together with their cronies – family members, friends, and close associates[24].

[22] *What Do Russians Dream of: Ideal and Reality.* Ed. by M.K. Gorshkov, R. Krumm, N.E. Tihonova. Moscow: Ves' Mir, 2013. 400 p.

[23] Dobren'kov V.I., Ispravnikova N.R. The Russian version of "crony capitalism": Is there a way out of the impasse? *Moscow State University Bulletin. Series 18. Sociology and Political Science,* 2013, no.3, pp. 26–55.

[24] State-powered business. Available at: https://jargaldefacto.com/article/biznes-s-gosudarstwenniim-dwigatelem

Thus, the nature of the ruling elites, who emerged due to the Soviet period's shortcomings and substituted their predecessors (partly because of technical capabilities), and the role of global capital are the special historical conditions V.V. Putin operates within. They have also been substantiating "oligarchic capitalism" as an essential attribute of the public administration system over the whole post-Soviet period.

Different sources, such as domestic statistics and foreign studies, clearly prove ongoing strengthening of its positions. "Oligarchic capitalism" formed in the 1990s, and Russia was placed second according to the volume of "crony capital" in 2014; it rose to the leading position in 2016[25] (*Tab. 1*).

2020 saw the release of the first report on the results of the study on quality of elites,

Table 1. Crony-capitalism index

Country	Rating in 2014*	Rating in 2016	2016 to 2014 (+/–)
Russia	**2**	**1**	**+1**
Malaysia	3	2	+1
Philippines	6	3	+3
Singapore	5	4	+1
Ukraine	4	5	-1
Mexico	7	6	+1
Indonesia	10	7	-3
Turkey	14	8	-6
India	9	9	0
Taiwan	8	10	-2
China	19	11	+8
Thailand	16	12	+4
South Africa	12	13	-1
Great Britain	15	14	+1
Brazil	13	15	-2
USA	17	16	+1
Argentina	11	17	-6
France	20	18	+2
Japan	21	19	+2
South Korea	22	20	+2
Poland	18	21	-3
Germany	23	22	+1
* In 2014, the ranking was headed by Hong Kong, which did not participate in the study in 2016.			

[25] The Economist ranked countries according to the Crony-Capitalism Index in 2014 and 2016. First, the rating evaluates industries that are prone to monopolization, requiring permits (licenses), and are dependent on state participation. The list consists of more than 10 industries, such as gambling, defense, coal and timber industries, savings banks, infrastructure, airports, real estate and construction, metals, mining, water supply, communication services. Then, the authors of the rating, based on data from Forbes, estimate the total wealth of billionaires and compare it with the country's GDP. The greater the difference, the more the economy suffers from crony capitalism.

conducted by University of Sankt-Gallen (Switzerland), Moscow School of Management SKOLKOVO, and dxFeed Solutions company. Within this study, 32 countries were ranked according to Elite Quality Index[26]. Although such ratings, in our opinion, are very conditional (since they do not consider countries' numerous territorial, climatic, demographic, and other conditions), it should be noted that Russia was ranked 23rd in this list (48.9 points). According to experts, it is "catastrophically behind" according to indicators like "an ability to build working institutions, focus on long-term development, some kind of altruism... In many ways, this is a legacy of a crucial era in the 90s, when the importance of the government, national economy, and shared future was devalued... State institutions were privatized and worked in private interests, power structures were demoralized, and sovereign foreign policy was paralyzed. **A large part of that elite, which came to realize only private ambition in politics and business, still rules the country: there was no significant rotation and clearing**"[27].

Thus, international studies and assessments of Russian experts show that, despite major advances Russia has achieved (geopolitical status, MIC status, etc.) during the post-Soviet period, the quality of its elites does not match the state capable of being among centers of a multipolar world. It also makes achievement of the "breakthrough development" goals, which V.V. Putin mentioned during his "pre- election" Address to the Federal Assembly in 2018, very difficult.

The same is also shown by Russian official statistics data: we revealed it after analyzing dynamics of crimes "against the state power, interests of the state service, and service in local self-government bodies" (more often it is called "official crimes"[28]).

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[26] Elite Quality Index (EQI) shows how the actions of elites and their approaches to wealth formation accelerate or slow down the development of countries. EQI reflects the degree of cumulative influence of national elites on society through measuring:

- indicators of well-being – activities on creating and redistributing values from one group of people to another,
- indicators of power, or potential for value withdrawal, as well as elites' ability to insist on their preferences and business models through countries' institutional mechanisms.

The countries from the research are studied in all their political and economic complexity on the basis of an extensive set of data from 72 unique aggregate indicators that compare the areas where values are created or withdrawn... Elites with a positive development power have the highest quality, and low quality elites significantly hinder the development of countries.

To determine the quality of elites in a particular country, EQI takes into account four basic parameters:

- economic power,
- economic value,
- political power,
- political value.

(Source: Elite Quality Index: How does it affect economic and political development: Skolkovo press-release. Available at: https://www.skolkovo.ru/news/indeks-kachestva-elit-kak-oni-vliyayut-na-ekonomicheskoe-i-politicheskoe-razvitie/).

[27] Grinkevich V. Justice is above everything else. *Zavtra*. November 25, 2020. Available at: https://zavtra.ru/blogs/spravedlivost_previshe_vsego

[28] The object of official crimes includes activities, specified by corresponding legal acts, of state bodies, local self-government bodies, state and municipal institutions, Russian Armed Forces and military formations of the Russian Federation provided for by the relevant legal acts.

The objective side of the studied crimes is related to an official's usage of the powers granted against the interests of the service.

The subject of crimes, according to Chapter 30 of the Criminal Code of the Russian Federation, may be: a)

a) officials and, in cases specified by the law, other government employees; b) officials and, in cases specified by the law, other employees of local self-government bodies; c) people who are not included in this list, if corresponding elements of a crime specify their responsibility along with responsibility of state or municipal officials.

Specific types of crimes "against the state power" include such offenses as: misuse of budget funds; misuse of funds of state extra-budgetary funds; inclusion of deliberately false information into the unified state registers; abuse of official authority; illegal participation in business activities; receiving a bribe; giving a bribe; mediation in bribery; petty bribery; official forgery; negligence, etc. (available at: https://be5.biz/pravo/u007/16_.html).

Table 2. Changes of the level of economic crimes in the Russian Federation in 2003–2020 (per 100 thousand people)

Form of crimes	Change (+/–)			
	Change of annual average data		2019 to 2018	Jan.–Oct. 2020 to Jan.–Oct. 2019
	2008–2012 to 2003–2007	2013–2017 to 2008–2012		
TOTAL number of economic crimes including :	-87.06	-134.95	-3.04	-0.66
heavy and especially grave crimes	-11.98	-48.35	-0.95	+0.08
*Corruption crimes**	n.d.	-13.48	+0.14	+0.24
against the state power, interests of the state service, and service in local self-government bodies	+3.43	-12.78	+0.47	+0.46
including: bribery crimes	+1.38	-0.87	+0.93	+0.41
*For reference: population of the Russian Federation (thousand people)***	+128458,5	+2478,08	-100	-32

* Data are available from 2012.
** As of January 1 of each year (Source: The Demographic Yearbook of Russia; operational information of the Federal State Statistics Service. Available at: https://rosstat.gov.ru/folder/12781).
Only the dynamics of changes are presented. Full information (absolute (number of cases) and relative (per 100 thousand people) data) is in insert 1.

The results of the statistical analysis for 2003–2020 allow drawing the following conclusions:

1. **The increase of the officials' criminal level in the country occurred during D. Medvedev's presidential term and the global financial crisis of 2008.** In 2008–2012, in comparison with a previous five-year period (2003–2007), the level of crimes "against state power" increased from 22.7 to 26.13 per 100 thousand people; cases of bribery grew up from 6.79 to 8.17 per 100 thousand people (*Tab. 2; Insert 1*).

2. **In the period from 2013 to 2017 (during V.V. Putin's third presidential term), the level of officials' crimes decreased by nearly two times (from 26 to 13 per 100 thousand people);** cases of corruption – from 96 to 47; cases of bribery – from 7 to 5 per 100 thousand people (Tab. 2; Insert 1). Apparently, this was the result of the intensified anti-corruption campaign.

3. **However, recently (2018–2019; January–October 2020, compared to the corresponding period of 2019), there have actually been no significant changes in the dynamics of the level of official crimes** (Tab. 2; Insert 1). A total number of crimes "against the state power" is 9 per 100 thousand people; cases of corruption – 16, cases of bribery – 6.

4. In the past three years (2017–2019), **there was a constant increase of crimes related to bribery in the country**: in 2017 – 1.55 per 100 thousand people; 2018 – 1.78; 2019 – 2.16 (Tab. 2; Insert 1).

5. Also the dynamics of economic crimes, characterized by large and large scale damage, is noteworthy *(Tab. 3; Insert 2)*. Their overall level gradually decreases: on average, over 2009–2012, it was 35.50 per 100 thousand people; in 2019 – 20.70, in January–October 2019 – 19.26; in January–October 2020 – 18.73.

However, considering this, a number of official crimes associated with large and especially large damage increases: in 2009–2012, it was 0.92 cases per 100 thousand people, in 2019 –1.56, in January–October 2019 – 1.40, in January–October 2020 – 1.62.

Table 3. Changes of the level of economic crimes in the Russian Federation, which were committed on a large or especially large scale or caused major damage (per 100 thousand people)*

Form of crimes	Change (+/–)		
	2013–2017 to 2009–2012	2019 to 2018	Jan.–Oct. 2020 to Jan. –Oct. 2019
TOTAL number of economic crimes including:	-16.04	+0.20	-0.53
heavy and especially grave crimes	-8.72	-3.00	-0.11
*Corruption crimes**	-1.36	-10.66	+0.29
against the state power, interests of the state service, and service in local self-government bodies	+0.02	+0.23	+0.22
including: bribery crimes	+0.43	+0.23	+0.23
*For reference: population of the Russian Federation (thousand people)***	+2453	-100	-32

* Data are available from January 2009. ** As of January 1 of each year (source: The Demographic Yearbook of Russia; operational information of the Federal State Statistics Service. Available at: https://rosstat.gov.ru/folder/12781).
Only the dynamics of changes are presented. Full information (absolute (number of cases) and relative (per 100 thousand people) data) is in insert 1.

According to the Judicial Department of the Supreme Court of the Russian Federation, a total number of people convicted of crimes under all articles of the Criminal Code of the Russian Federation decreased in 2012–2019 (from 516 to 407 per 100 thousand people), but a number of people convicted of crimes "againststate power..." slightly increased (in 2012 –4.65 per 100 thousand people; in 2019 – 4.71; *Tab. 4*).

A two times growth is also shown by the dynamics of a number of those who committed an official crime and was sentenced to imprisonment (in 2012 – 0.368 per 100 thousand people; in 2019 – 0.790; Tab. 4)[29].

Table 4. Dynamics of a number of people convicted under Chapter 30 of the Criminal Code of the Russian Federation "Crimes against the state power, interests of the state service, and service in local self-government bodies" for 2012– 1 half of 2020 (number of convicted per 100 thousand people)

Type / severity of punishment	Yearly data				Monthly data		Change (+/–)	
	2012	2017	2018	2019	1st half of 2019	1st half of 2020	2019 to 2018	Average for the 1st half of 20202 to the 1st half of 2019
TOTAL number of convicted in all cases of the he RF CC	**516,774**	**474,818**	**448,182**	**407,556**	**198,706**	**159,611**	**-109.218**	**-39.095**
TOTAL number of convicted under Chapter 30 of RF CC	**4,637**	**4,996**	**4,933**	**4,709**	**2,177**	**1,697**	**+0.072**	**-0.480**
Among them, a number of people sentenced to imprisonment	0.368	0.766	0.731	0.790	0.353	0.250	+0.422	-0.103
Among them: less than 1 year	0.057	0.112	0.095	0.093	0.042	0.022	+0.036	-0.020
1–5 years	0.266	0.467	0.443	0.480	0.214	0.153	+0.214	-0.061
5–10 years	0.041	0.174	0.180	0.209	0.092	0.072	+0.168	-0.020
10 and more years	0.003	0.014	0.013	0.007	0.005	0.003	+0.004	-0.002
Suspended sentence to imprisonment	1.064	0.984	1.037	1.169	0.534	0.407	+0.105	-0.127

Data for Chapter 30 of the RF CC "Crimes against the state power, interests of the state service, and service in local self-government bodies" are given since 2012.
Own calculation based on: summary statistical data on the state of criminal records in Russia of the Judicial Department under the Supreme Court of the Russian Federation (available at: http://www.cdep.ru/index.php?id=79).

[29] Most often, the sentence is imposed on people who committed such types of official crimes as "petty bribery, receiving a bribe, giving a bribe personally or through an intermediary in an amount not exceeding ten thousand rubles" (according to data for the 1st half of 2020 – 0.476 per 100 thousand people); "giving a bribe to an official, a foreign official for committing deliberately illegal actions (inaction)" (0.305) and "abusing official authority committed by a person holding an official position in the Russian Federation under aggravating circumstances " (0.157). Source: Summary statistical data on the state of criminal records in Russia of the Judicial Department under the Supreme Court of the Russian Federation. Available at: http://www.cdep.ru/index.php?id=79.

Insert 1

Dynamics of certain types of economic crimes in the Russian Federation in 2003–2020

Type of crimes	Average annual data for the period						Yearly data				Average monthly data for the period				Change (+/–)			
	2003–2007		2008–2012		2013–2017		2018		2019		Jan.–Oct. 2019		Jan.–Oct. 2020		2019 to 2018		Average for Jan.–Oct. 2020 to Jan.–Oct. 2019	
	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people
TOTAL number of economic crimes including:	433124,2	301.26	305897,60	214.20	115062,40	79.25	109463,00	74.53	104927,00	71.49	97114,00	66.16	96124,00	65.50	-4536	-3.04	-990	-0.66
heavy and especially grave crimes	154586,8	107.53	136465,80	95.55	68541,60	47.20	64736,00	44.07	63285,00	43.12	60102,00	40.95	60209,00	41.03	-1451	-0.95	+107	+0.08
*Corruption crimes**	n.d.	n.d.	49028,00	34.27	30159,20	20.79	23234,00	15.82	23427,00	15.96	21185,00	14.43	21523,00	14.67	+193	+0.14	+338	+0.24
against the state power, interests of the state service, and service in local self-government bodies	32632,40	22.70	37321,40	26.13	19360,40	13.35	13262,00	9.03	13949,00	9.50	12454,00	8.48	13113,00	8.94	+687	+0.47	+659	+0.46
including: bribery crimes	9754,80	6.79	11675,00	8.17	10595,80	7.30	7090,00	4.83	8459,00	5.76	7493,00	5.10	8081,00	5.51	+1369	+0.93	+588	+0.41
*For reference: population of the Russian Federation (thousand people)***	14389,50		142848,00		145326,08		146880,40		146780,70		146780,70		146748,60		-100.00		-32.00	

Information provided since January 2003.

* Data are available from January 2012.

** As of January 1 of each year (source: The Demographic Yearbook of Russia; operational information of the Federal State Statistics Service. Available at: https://rosstat.gov.ru/folder/12781).

Source: own calculation according to monthly reports of the Ministry of Internal Affairs of the Russian Federation on the state of crime in the Russian Federation (available at: https://мвд.рф/folder/101762).

Detailed information about bribery crimes against the state power, interests of the state service, and service in local self-government bodies for 2017–2020

Type of crimes	Yearly data						Average monthly data for the period				Change (+/–)			
	2017		2018		2019		Jan.–Oct. 2019		Jan.–Oct. 2020		2019 to 2018		Average for Jan.– Oct. 2020 to Jan.– Oct. 2019	
	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people
Total number of bribery crimes, including:	6270	4.27	7090	4.83	8459	5.76	7493	5.10	8081	5.51	+1369	+0.93	+588	+0.41
bribe receiving	3188	2.17	3499	2.38	3988	2.72	3536	2.41	3744	2.55	+489	+0.34	+208	+0.14
bribe giving	2272	1.55	2612	1.78	3174	2.16	2770	1.89	3118	2.12	+562	+0.38	+348	+0.23
mediation in bribery	810	0.55	979	0.67	1297	0.88	1187	0.81	1219	0.83	+318	+0.21	+32	+0.02
*For reference: population of the Russian Federation (thousand people)***	146804,4		146880,4		146780,7		146780,7		146748,6		-100.0		-32.0	

Information on cases of taking and giving bribes is given since 2017.

*As of January 1 of each year (source: The Demographic Yearbook of Russia; operational information of the Federal State Statistics Service. Available at: https://rosstat.gov.ru/folder/12781).

Source: own calculation according to monthly reports of the Ministry of Internal Affairs of the Russian Federation on the state of crime in the Russian Federation (available at: https://мвд.рф/folder/101762).

Insert 2

Dynamics of certain types of economic crimes in the Russian Federation in 2009–2020, which were committed on a large or especially large scale or caused major damage

Type of crimes	Average annual data for the period				Yearly data				Average monthly data for the period				Change (+/–)			
	2009–2012		2013–2017		2018		2019		Jan.–Oct. 2019		Jan.–Oct. 2020		2019 to 2018		Average for Jan.– Oct. 2020 to Jan.– Oct. 2019	
	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people
TOTAL number of economic crimes including:	50708,00	35.50	28289,00	19.46	30132,00	20.51	30398,00	20.71	28271,00	19.26	27485,00	18.73	+266	+0.20	-786	-0.53
heavy and especially grave crimes	31941,50	22.36	19832,00	13.64	27967,00	19.04	23537,00	16.04	22023,00	15.00	21858,00	14.89	-4430	-3.00	-165	-0.11
*corruption crimes**	7437,00	5.20	5589,60	3.84	22888,00	15.58	7223,00	4.92	6624,00	4.51	7044,00	4.80	-15665	-10.66	+420	+0.29
against the state power, interests of the state service, and service in local self-government bodies	1320,00	0.92	1370,20	0.94	1947,00	1.33	2293,00	1.56	2060,00	1.40	2370,00	1.62	+346	+0.23	+310	+0.22
including: bribery crimes	343,00	0.24	974,00	0.67	1760,00	1.20	2102,00	1.43	1883,00	1.28	2222,00	1.51	+342	+0.23	+339	+0.23
*For reference: population of the Russian Federation (thousand people)***	142873,1		145326,1		146880,4		146780,7		146780,7		146748,6		-100.0		-32.0	

Information provided since January 2003.
* As of January 1 of each year (source: The Demographic Yearbook of Russia; operational information of the Federal State Statistics Service. Available at: https://rosstat.gov.ru/folder/12781).
Source: own calculation according to monthly reports of the Ministry of Internal Affairs of the Russian Federation on the state of crime in the Russian Federation (available at: https://мвд.рф/folder/101762).

Detailed information about large and especially large bribery crimes against the state power, interests of the state service, and service in local self-government bodies for 2017 – 2020

Type of crimes	Yearly data						Average monthly data for the period				Change (+/–)			
	2017		2018		2019		Jan.–Oct. 2019		Jan.–Oct. 2020		2019 to 2018		Average for Jan.– Oct. 2020 to Jan.– Oct. 2019	
	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people	number of cases	number of cases per 100 thousand people
Total number of bribery crimes, including:	1541	1.05	1760	1.20	2102	1.43	1883	1.28	2222	1.51	+342	+0.23	+339	+0.23
bribe receiving	808	0.55	908	0.62	1041	0.71	937	0.64	1079	0.74	+133	+0.09	+142	+0.1
bribe giving	401	0.27	482	0.33	571	0.39	490	0.33	639	0.44	+89	+0.06	+149	+0.11
mediation in bribery	332	0.23	370	0.25	490	0.33	456	0.31	504	0.34	+120	+0.08	+48	+0.03
Для справки: *For reference: population of the Russian Federation (thousand people)**	146804,4		146880,4		146780,7		146780,7		146748,6		-100.0		-32.0	

Information on cases of taking and giving bribes is given since 2017.
* As of January 1 of each year (source: The Demographic Yearbook of Russia; operational information of the Federal State Statistics Service. Available at: https://rosstat.gov.ru/folder/12781).
Source: own calculation according to monthly reports of the Ministry of Internal Affairs of the Russian Federation on the state of crime in the Russian Federation (available at: https://мвд.рф/folder/101762).

Thus, aforementioned official statistics data show that there are no significant positive changes in the dynamics of the level of official crimes and people convicted under Chapter 30 of the Criminal Code of the Russian Federation "Crimes against the state power, interests of the state service, and service in local self-government bodies". First, this is an indicative characteristic of the ruling elites, and, secondly, it has a psychological aspect of its consequences, which has no less, and perhaps more, influence on the civilizational and historical development of the state, undermining the main foundation which V.V. Putin's "deep state" is built on – public trust.

> "One of the main Russian problems, which is both a cause and a consequence of a limited quality of elites, is a universal lack of trust: the government does not trust citizens and business; citizens and business do not trust each other and the government. It increases the cost of doing business, pushes private business into the arms of the government to protect and withdraw rents, reduces the effectiveness of institutions, replacing them with personal decisions, and ultimately drives capital and brains out of the country. It is impossible to reveal a true potential of Russia without working on this common problem"[30].

Along with the global process of actualization of subjective factors[31], trust becomes the "cornerstone" of historical development and current state of affairs in any state: especially in Russia where "sacred relations between society and the President"[32] are the core of an entire statehood. However, when Russians say that the level of corruption in the sphere of state and municipal property is 78%; 75% in the sphere of state and municipal control; 74% in the judicial system; 63% in the sphere of housing and communal services; up to 44% in healthcare and education[33], it becomes quite clear why experts, assessing the quality of Russian elites and related problems, **primarily say about a common lack of trust.** Despite a long-running anti-corruption campaign, 81% of Russians consider corruption in Russia a truly serious problem, and only 11% see progress in the fight against it[34].

According to the results of activities of the investigative bodies, a lot of facts have been published in recent years, showing:

✓ first, deep roots of the corruption in all bodies of public power (from municipal officials to federal ministers): across the entire vertical of the public administration system;

> "There are barely any loners in this [corrupt] environment – this is simply unimaginable. There are links, including ones with law enforcement agencies, colleagues, and so on"[34].

✓ second, its horizontal widespread which makes main figurants, involved in criminal cases, their subordinates, colleagues, relatives,

[30] Elite Quality Index: How does it affect economic and political development: Skolkovo press-release. 2020 (President of the Skolkovo Business School A. Sharonov, Rector of the New Economic School R. Enikolopov). Available at: https://www.skolkovo.ru/news/indeks-kachestva-elit-kak-oni-vliyayut-na-ekonomicheskoe-i-politicheskoe-razvitie/.

[31] Gorshkov M.K. On the axiomatic interpretation of the economic factors' impact on economic growth. *Economic and Social Changes: Facts, Trends, Forecast,* 2014, no. 3 (33), pp. 45–56.

[32] Surkov V.Yu. Vladimir Putin's long state. *Nezavisimaya Gazeta,* February 11, 2019. Available at: http://www.ng.ru/ideas/2019-02-11/5_7503_surkov.html

[33] A sociological survey conducted by the Prosecutor General's Office in June 2019. A total number of Russians surveyed is 38 thousand in all regions of the Russian Federation (source: The Prosecutor General's Office named the leaders in terms of corruption – security forces, courts, and executive branch. Available at: https://pasmi.ru/archive/245653/).

[34] *Ibidem.*

[35] Nikolaev A. The FSB has been collecting dirt for years: Why officials are "caught" when billions have already been stolen (opinion of S. Reznik). *Tsar-Grad,* October 15, 2019. Available at: https://yandex.ru/turbo/tsargrad.tv/s/articles/kompromat-fsb-sobiraet-godami-pochemu-chinovnikov-berut-kogda-uzhe-ukradeny-milliardy_221740

and friends its subjects and beneficiaries; basically, dozens of people are related to every solved case[36];

✓ third, information about outrageous sums of money (denominated in foreign currency, gold, movable and immovable property), which appear in nearly every case on corruption, becomes publicly accessible. Most often, the property found in the possession of people involved in such criminal cases is ten times higher than an amount of funds they were "caught" for[37]. It also indicates that these individuals' targeted violation of the law was not episodic, but regular and systematic.

Earlier, we often referred to similar cases that had caused the widest resonance in the Russian society[38]. To illustrate, some of them are presented in *insert 3*. However, by and large, all such cases, even recent ones, cannot be listed in one article. However, it is also difficult to accurately determine amounts of stolen funds in each specific criminal case and financial damage amount that the Russian economy, the state and, ultimately, general population suffer from this.

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[36] For example:

After the arrest of the governor of the Sakhalin Oblast A. Khoroshavin (2015), collective detentions of members of the regional government began. Former minister of agriculture of Sakhalin N. Borisov, who supervised the fishing industry, former deputy prime minister of Sakhalin S. Karepkin, acting vice-mayor of Yuzhno-Sakhalinsk A. Leskin, as well as his predecessor M. Magomedov, were arrested. **A total amount of bribes, imputed to ex-officials, is estimated at tens of millions of rubles** (source: The mayor of Okha will leave the post due to the case of ex-minister of Sakhalin. Federal mass media "The First Anti-Corruption Media", May 13, 2015. Available at: https://pasmi.ru/archive/124308/).

In the case of ex-governor of Komi V. Gaizer (2015), **almost four dozen officials, deputies, and businessmen were arrested,** more episodes and cases related to the former leadership of the republic are regularly revealed (source: Shevchuk M. What are the arrested governors waiting for? Delovoi Peterburg. October 25, 2020. Available at: https://www.dp.ru/a/2016/10/25/CHego_zhdut_arestovannie_gu).

[37] Specific examples (source: Barova E. Money in bags. What did the corruption suspects keep at home? Argumenty i Fakty, March 1, 2019. Available at:https://aif.ru/money/corruption/dengi_meshkami_chto_hranili_doma_podozrevaemye_v_korrupcii):

In 2013, the head of the Voronezh Avtodor A. Trubnikov was caught on a bribe of 1.4 million rubles. During a search at his dacha, police found 134 million rubles in cash in different currencies – money was lying around the house in boxes and bags. In 2015, the official was sentenced to 7.5 years of strict regime, but he spent only 10.5 months behind bars (plus 9 months in a detention center). Trubnikov was released on January 31, 2017 on parole due to an oncological disease. His wife N. Trubnikova, "whom he left without a penny", sued the right to half of money in 2017. The court released from arrest 66.5 million rubles, seized during the search in Trubnikov's house.

In 2016, due to bribery in the form of an auto Porsche Cayenne, the deputy head of the department of the Federal Reserve for the Siberian Federal District I. Garifullin was arrested. With an official salary of 46 thousand rubles a month, he was found to have 135 million in cash at home and in a safe deposit box; expensive collections of guns (half a million each) and watches... Many stuffed animals were placed along the walls of the house, and bear skins were placed on the floor... The top manager had a whole auto park: two KAMAZ trucks, a Land Cruiser 200 Arctic Track, a Porsche Panamera, a Porsche Cayenne, a Range Rover Sport, a Volkswagen Multivan, and a Volkswagen Phaeton.

3. During a search in the residence of senator R. Arashukov, police found gold bars, sabers, daggers, and bundles of money. Jewelry were weighed in a pile – it was tens of kilos.

4. Police took out almost one and a half tons (!) of money in boxes – 9 billion rubles in different currencies and a gold bar for half a kilogram from an apartment of the sister of police officer D. Zakharchenko in Moscow. Later, 13 apartments were found in Zakharchenko and his relatives' possession. Zakharchenko's arrest in September 2016 received a wide response due to the amount of cash that investigators found on him and his relatives during searches – $140 million, €2.2 million, and 374 million rubles. At the time of his arrest, the colonel was charged only with a bribe of 7 million rubles from a businessman A. Pshegornitskii (source: RBK, June 10, 2019. Available at: https://www.rbc.ru/society/10/06/2019/5cf666929a7947ce194162ae).

5. Former finance minister of the Moscow Oblast A. Kuznetsov hid a whole "Hermitage". In 2014, in St. Petersburg, the investigation team found a hangar containing 82 pieces of antique furniture, 113 paintings by famous artists, 2 ancient icons, and 13 boxes of rare books. According to investigators, all these goods were planned to be transported abroad for 4 billion rubles.

[38] See:

Ilyin V.A., Morev M.V. "...And most importantly, there will be no destitute people in Russia". "Capitalism for the few" – a key problem of national security. *Economic and Social Changes: Facts, Trends, Forecast,* 2018, vol. 11, no. 2, pp. 9–23.

Ilyin V.A. Significance of the thesis "cadres decide everything" as applied to modern Russia. *Economic and Social Changes: Facts, Trends, Forecast,* 2017, vol. 10, no. 3, pp. 9–31.

Insert 3

Some "well-known" crimes of the ruling elites at all levels of public power*

Year of arrest	Name	Post	Article	Estimated or determined amount of damage; discovered money, jewelry	Restraint/sentence
Federal level					
2002	Aksenenko N.	Minister of Railways	Abuse of authority, misappropriation, embezzlement	70 mil. rub.	Restriction of travel order, released for treatment in Germany
2008	Adamov E.	Minister of Atomic Energy (1998–2001)	Abuse of authority	100 mil. dollars	Suspended sentence
2011	Donskih O.	Director of the Department of the Ministry of Agriculture of the Russian Federation	Fraud	800 mil. rub.	Wanted by authorities
2012	Vasil'eva E.	Head of the Department of the Ministry of Defense of the Russian Federation	Fraud, money laundering, abuse of authority	1–3 bil. rub.	Released on parole
2013	Bazhanov A.	Deputy Minister of Agriculture of the Russian Federation (2009-2010)	Fraud, money laundering	1.1 bil. rub.	Wanted by authorities
2013	Serdyukov A.	Minister of Defense of the Russian Federation	Negligence	56 mil. rub.	Criminal case dismissed under amnesty
2013	Shishkin A.	Deputy Head of Gosstroi	Fraud	30 mil. rub.	6 years in a standard regime penal colony
2013	Skrynnik E.	Minister of Agriculture of the Russian Federation (2009-2012)	Large scale fraud	39 bil. rub.	Criminal proceedings are not completed
2015	Sugrobov D.	Head of the Department of Economic Security and Anti-Corruption of the MIA	Creation of a criminal community, abuse of authority, provocation of a bribe	218 mil. rub.	Detention center
2016	Zaharchenko D.	Deputy Head of the MIA Main Directorate of Economic Security and Combating the Corruption	Bribe	8.5 bil. rub.	Detention center
2016	Lopyrev G.	Head of the Federal Security Service for the North Caucasus Federal District	Large scale bribe	1 bil. rub.	Detention center
2016	Ulyukaev A.	Minister of Economic Development of the Russian Federation	Bribe	2 mil. dollars	House imprisonment
2016	Pirumov G.	Deputy Minister of Culture of the Russian Federation	Fraud	50 mil. rub.	Detention center
2017	Artamonov V.	Former Deputy Minister of EMERCOM	Large scale embezzlement	1.3 mil. rub.	3-year probation
2019	Ishaev V.	Ex-Minister for the Development of the Far East	Large scale organization of embezzlement and misappropriation of entrusted property, committed with the use of official position	7.5 mil. rub.	House imprisonment

Year of arrest	Name	Post	Article	Estimated or determined amount of damage; discovered money, jewelry	Restraint/sentence
2019	Arashukov R.	Senator from Karachay-Cherkessia	Abuse of official authority, deliberately false denunciation, involvement in contract killings, creation of a criminal community, pressure on witnesses	30 bil. rub.	Criminal proceedings are not completed
2020	Arslanov H.	Deputy Chief of the General Staff of the Armed Forces of the Russian Federation	Large scale fraud and bribe	6.7 bil. rub.	Detention center
2020	Gairbekov R.	Head of the Military and Technical Cooperation Division of the Department of Defense Industry Complex of the Ministry of Industry and Trade	Large scale bribe	2 mil. rub.	Criminal proceedings are not completed
2020	Abyzov M.	Ex-Minister for "Open Government"	Creation of a criminal community, large scale money laundering, illegal entrepreneurship, large scale fraud	36 bil. rub.	Criminal proceedings are not completed
2020	Men' M.	Ex-Head of the Minstroi, Auditor of the Accounting Chamber	Embezzlement	700 mil. rub.	Criminal proceedings are not completed
Regional level					
2011	Dudka V.	Governor of the Tula Oblast	Bribe	40 mil. rub.	9.5 years in a standard regime penal colony
2012	Kuznetsov M.	Minister of Finance of the Moscow Oblast Government	Fraud, money laundering	11 bil. rub.	14 years in a colony
2014	Yurchenko V.	Governor of the Novosibirsk Oblast	Negligence, abuse of authority	13.3 mil. rub.	3-year probation
2015	Gaizer V.	Head of the Komi Republic	Organization of a criminal community, bribe	1 bil. rub.	Detention center
2015	Horoshavin A.	Governor of the Sakhalin Oblast	Bribe, money laundering	522 mil. rub.	Detention center
2015	Nelidov A.	Head of the Republic of Karelia	Bribe	4.6 mil. rub.	Colony
2015	Denin N.	Governor of the Bryansk Oblast	Abuse of aithority by a person holding a public position in a constituent entity of the Russian Federation	21.8 mil. rub.	4 years in a standard regime penal colony
2015	Lukoyanov V.	Vice-Governor of Krasnodar Krai	Abuse of aithority	32 mil. rub.	Detention center, then – house imprisonment.
2015	Sandakov N.	Vice-Governor of the Chelyabinsk Oblast	Bribe, fraud	1.5 mil. rub.	5.5 years in a standard regime penal colony
2016	Belyh N.	Governor of the Kirov Oblast	Bribe	20 mil. rub.	Detention center
2016	Torlopov V.	Head of the Komi Republic	Creation of a criminal community, fraud	2.5 bil. rub.	House imprisonment
2017	Markelov L.	Head of the Mari El Republic	Bribe, abuse of authority, possession of ammunition	235 mil. rub.	Criminal proceedings are not completed
2017	Solov'ev A.	Head of the Udmurtia Republic	Bribe	139 mil. rub.	10 years in a standard regime penal colony

Year of arrest	Name	Post	Article	Estimated or determined amount of damage; discovered money, jewelry	Restraint/sentence
2017	Yurevich M.	Governor of the Chelyabinsk Oblast	Bribe, incitement to slaunder	26 mil. rub.	Case is dismissed due to the expiration of the statute of limitations
2018	Vinnikov A.	Governor of the Jewish AO	Abuse of authority	24 mil. rub.	4 years of probation
2019	Kon'kov P.	Governor of the Ivanovo Oblast	Large scale embezzlement and impropriation	700 mil. rub.	Detention center; from March 12, 2020 – house imprisonment
2020	Polovnikov V.	Head of the Komi Republic MIA	Large scale bribe receivement	25 mil. rub.	Criminal proceedings are not completed
2020	Furgal S.	Governor of Khabarovsk Krai	Attempted murder, organization of murders	–	Criminal proceedings are not completed
2020	Plitko A.	Vice-Governor of the Kirov Oblast	Large scale bribe receivement	10.5 mil. rub.	Criminal proceedings are not completed
2020	Koval' A.	Vice-Governor of the Leningrad Oblast	Large scale fraud	28 mil. rub.	2 months in a detention center, 21 mil. rub. fine
Municipal level					
2010	Trofimov V.	Deputy Prosecutor of the NAO in Moscow	Fraud, extortion of bribe	3 mil. dollars	Sentenced to 13.5 years, term was reduced by 5 years
2012	Bestuzhev I.	Mayor of Stavropol	Bribe	50 mil. rub.	9 years in a penal colony with a strict regime
2012	Tarasov E.	City Manager of Ozersk	Theft	22 mil. rub.	Detention center, then – house imprisonment
2013	Prokopenko A.	Head of the Administration in Saratov	Large scale misappropriation or embezzlement committed by an organized group; negligence; malicious non-execution of court decisions	500 mil. rub.	Criminal proceedings are not completed
2013	Urlashov E.	Mayor of Yaroslavl	Extortion, bribe	17 mil. rub.	12.5 years in a penal colony with a strict regime
2013	Stolyarov M.	Mayor of Astrakhan	Bribe	10 mil. rub.	10-year imprisonment
2014	Nikolaichuk N.	Mayor of Tomsk	Abuse of authority	36 mil. rub.	4 years of probation
2014	Prokopuk A.	Mayor of Tula	Large scale embezzlement committed using one's authority	31.7 mil. rub.	7 years in a standard regime penal colony
2014	Shkrabalyuk A.	Mayor of Okhi	Abuse of authority	331 mil. rub.	Released under amnesty
2015	Savintsev I.	Mayor of Barnaul	Abuse of authority; attempted misappropriation and embezzlement	17 mil. rub.	4 years of probation

Year of arrest	Name	Post	Article	Estimated or determined amount of damage; discovered money, jewelry	Restraint/sentence
2015	Pozdeev I.	Mayor of Syktyvkar	Malicious abuse of authority; abuse of authority; large scale misappropriation committed using one's authority	12.5 mil. rub.	7-year imprisonment
2016	Pushkarev I.	Head of Vladivostok	Malicious abuse of authority, commercial bribery	160 mil. rub.	Detention center
2016	Sverchkov V.	Head of Ivanovo	Bribe	12.7 mil. rub.	5 in a penal colony with a strict regime
2017	Klement'eva I.	Mayor of Cheboksary	Malicious abuse of authority, embezzlement	20 mil. rub.	5 years in a standard regime penal colony
2018	Musaev M.	Mayor of Makhachkala	Abuse of authority	48 mil. rub.	4 years in a standard regime penal colony
2019	Bykov V.	*Mayor of* Kirov	Large scale bribe	7.8 mil. rub.	House imprisonment
2019	Gogolev V.	Deputy Mayor of Yakutsk	Malicious abuse of authority	165 mil. rub.	4 years in a standard regime penal colony
2020	Filonov A.	Mayor of Yevpatoria	Execution by an official of actions that are clearly beyond his powers and which entailed a significant violation of the rights and legitimate interests of citizens	.43 mil. rub.	3.8 years in a settlement colony
2020	Kurakin D.	Deputy Chairman of the Government of the Moscow Oblast	Large scale fraud; malicious abuse of authority; bribe receivement	2 bil. rub.	Criminal proceedings are not completed
2020	Klyain I.	Mayor of Tomsk	Abuse of authority	1.3 bil. rub.	Criminal proceedings are not completed

*Ranked according to the year of arrest.

Sources (they also contain more detailed information about these cases):

1. Official websites of federal and regional mass media: "Novaya Gazeta", "Zavtra", "Kommersant", "Izvestiya", "Rossiyskaya Gazeta", "Komsomolskaya Pravda. Vologda", "Komsomolskaya Pravda. Saint Petersburg", "Komsomolskaya Pravda. Chelyabinsk", "Komsomolskaya Pravda. Yaroslavl", information agency "Sever-Media" (Syktyvkar), information agency "Vzglyad-Info" (Saratov Oblast), "Altapress" (News of Barnaul and Altai Krai), news of Channel One (available at: https://www.1tv.ru/), news of Chelyabinsk (available at: https://cheb.media/).
2. Official websites of federal and regional news media: RIA-Novosti, Rambler News, TASS, Lenta.ru, 47-news.ru, RBK, Interfaks, news of the Ivanovo Oblast (available at: https://www.ivanovonews.ru/), web-portal of the Southern region "Yuga.ru" (available at: https://www.yuga.ru/).
3. Other information resources: "Zakon i Poryadok" (available at: https://zakon-i-poryadok.com/); international TV company of Germany Deutsche Welle (available at: https://www.dw.com/en/top-stories/s-9097); project "Virtual'nyi Korenovsk" (available at: http://mykor.ru/), online media "Octagon.Media" (available at: https://octagon.media/), online media "Information agency Prima-Media", online media "vtomske.ru".

"The bureaucratic caste, at a higher level, resembles a gypsy camp with a mutual guarantee. Current corrupt officials learned to manipulate the legislation by holding competitions to select contractors and concluding state contracts in a beneficial way for them"[39].

Aforementioned facts involuntarily provoke thoughts that the system of public administration, which could be compared to a human body[40], is infected with different types of economic crimes similar to metastases of an oncologic disease deeply penetrating inside and out and making its further existence and development impossible. This psychological point escapes the attention of official statistics since the Criminal Code of the Russian Federation does not provide for a correlation between a term of punishment and an amount of stolen funds.

Mikhailov A. (retired General-Lieutenant, former operative of the 5th directorate of the USSR KGB, who later headed the Center for Public Relations of the FSB of Russia and the MIA Information Department): *"Sometimes it seems that they are trying to impress us by the scale of such arrests. As if the higher the amount, the more expressive it is. But this is fundamentally wrong! It is necessary to stifle corruption in the bud. After all, there is no difference in a punishment measure in the Criminal Code: whether a million, a billion, or eight billion were stolen. The article is the same, the term is the same.*

For some reason, it is necessary to gain a scary level of anger among population. Why cannot they be imprisoned earlier? It is easier to prove, and a crime itself is prevented. But no: they wind up a whole tangle of countless similar incidents, and only then they start to unwind it. Something certainly "falls off" in court because of unprovenness, and this causes even greater dissatisfaction of ordinary people: "So he payed off". My firm opinion is that officials should be prosecuted not for theft but for high treason. With severe punishment. This is when something will start to change"[41].

As a result, no matter how many more high-profile arrests occur, they further strengthen the idea in society that this is only a "tip of an iceberg", and a real scale of corruption in the country remains somewhere far beyond public understanding. It is no accident (as the results of the survey of the Prosecutor General's Office showed) that 85% of Russians think that "media hide most information about corruption"[42].

Nevertheless, at the last press conference of the President held on December 17, 2020, questions about a high level of corruption in our country were not reflected. Either these issues do not concern journalists and society, or they do, but somehow such questions "did not reach" the President. In any case, the President's clear position on the prospects of the anti-corruption campaign, the existence of a specific plan for prevention and systemic solution of this issue was not voiced. Although, in our opinion, this is very important, because it is not about corruption itself, which acts as an indicator of the ruling elites quality, but their moral attitudes and principles; responsibility to society. This is a much broader issue, and it determines the nature of interaction and relations between society and the authorities at all levels of government.

[39] Nikolaev A. The FSB has been collecting dirt for years: Why officials are "caught" when billions have already been stolen (opinion of S. Reznik). *Tsar-Grad*, October 15, 2019. Available at: https://yandex.ru/turbo/tsargrad.tv/s/articles/kompromat-fsb-sobiraet-godami-pochemu-chinovnikov-berut-kogda-uzhe-ukradeny-milliardy_221740

[40] Sulakshin S.S. *Quality and Success of Public Policies and Management.* Series "Political Axiology". Moscow: Nauchnyi Ekspert, 2012. Pp. 6, 12.

[41] Nikolaev A. The FSB has been collecting dirt for years: Why officials are "caught" when billions have already been stolen (opinion of S. Reznik). *Tsar-Grad*, October 15, 2019. Available at: https://yandex.ru/turbo/tsargrad.tv/s/articles/kompromat-fsb-sobiraet-godami-pochemu-chinovnikov-berut-kogda-uzhe-ukradeny-milliardy_221740

[42] Sociological survey conducted by the Prosecutor General's Office in June 2019. Total number of Russians surveyed is 38 thousand in all entities of the RF (source: Prosecutor General's Office named the leaders in terms of corruption – siloviki, courts, and the executive branch. Available at: https://pasmi.ru/archive/245653/).

Thus, we see that the problem of corruption in modern Russia has complex consequences. This is not just the loss of financial resources that could be used to solve the most pressing issues of population, but also outright failures in the implementation of the President's goals. Besides, corruption undermines society's confidence in the government which makes the level of social stability in the country unstable, halting the constructive implementation of reforms. "If people do not see justice, they become disappointed and hesitate to follow such leadership"[43].

Polterovich V.M.: "A low level of confidence significantly hinders reforms, and unsuccessful reforms lead to its further decline"[44].

In many ways, this, not just the impact of the pandemic, explains a recent decline of society's positive emotional mood in recent months (*Insert 4; Fig. 1*), a stable proportion of those who subjectively classify themselves as "poor and extremely poor" (Insert 4*; Fig. 2*), as well as an increase of pessimism about the prospects of the Russian economy and their personal financial situation, which is clearly seen in the decline in the Consumer Sentiment Index, recorded not only by regional (Insert 4*; Fig. 3*) but also federal sociological studies (Insert 4*; Fig. 4*).

Ultimately, oligarchic capitalism and corruption, as its constant attribute, originated during the USSR collapse, and they reflect the quality of Russian modern elites. This leads to complex negative consequences in the system of government and society, manifesting itself primarily in the stalled implementation of national development goals and unmet expectations of wide segments of population in relation to the dynamic development of the level and quality of life and achievement of social justice.

"We must understand that no matter how brilliant the economic, social, or military strategy of the country is, everything will be incompetently failed, stolen, and lost if the implementation is entrusted to failed elite in terms of quality... Good elite "creates values": it lives and allows others to live well and increase their well-being. Bad elite "extracts values": it plunders and appropriates the general wealth without caring about the state and people. In both cases, elite gets richer. However, Singapore's elite take less than they create, and, in Nigeria, elite appropriates more than they make... **good elite increases a "common pie", bad elite chews out a large personal piece of this pie. Thus, a degree of altruism, a desire to work for the good of the country determines, ultimately, the quality of elites"**[46].

Is the President aware of the consequences of corruption, and what measures does he take in this regard?

According to the Federal Law "On combatting corruption"[46], the President "defines main areas of the state policy concerning combatting corruption" and "determines the competence of the federal executive bodies, the management of which it carries out, in the field of combating corruption" (Art. 5, S. 1). It is appropriate to remember the speech of V.V. Putin at the Meeting of the Prosecutor General's Office Board in March 2020, where he noted:

[43] Grinkevich V. Justice is above everything else. *Zavtra*. November 25, 2020. Available at: https://zavtra.ru/blogs/spravedlivost_previshe_vsego

[44] Polterovich V.M. Institutional reforms and the civic culture. *Historical and Social-Educational Idea*, 2016, vol. 8, no. 2/2. P. 228.

[45] Grinkevich V. Justice is above everything else. *Zavtra*. November 25, 2020. Available at: https://zavtra.ru/blogs/spravedlivost_previshe_vsegoo

[46] On combatting corruption: Federal Law no.273, dated December 25, 2008. *Official website of the President of Russia*. Available at: http://www.kremlin.ru/acts/bank/28623

Insert 4

Dynamics of social attitudes, subjective perception of living standards, and economic development prospects in assessments of public opinion

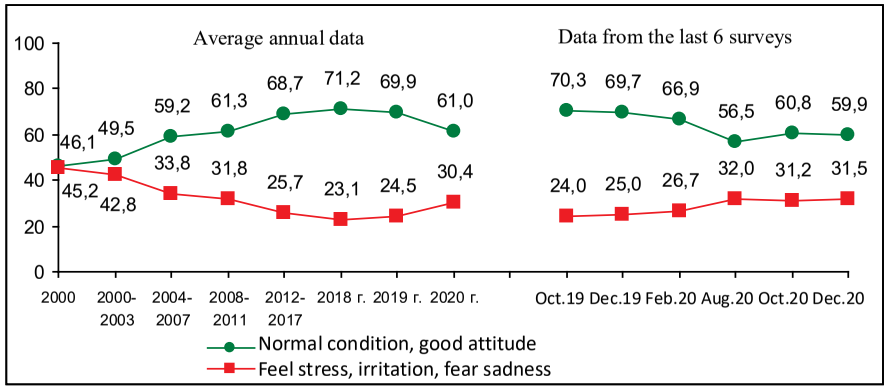

Fig. 1. Social attitude (Vologda Oblast, VolRC RAS data, % of respondents)*
* Question wording: "How would you assess your attitude in the last few days?"

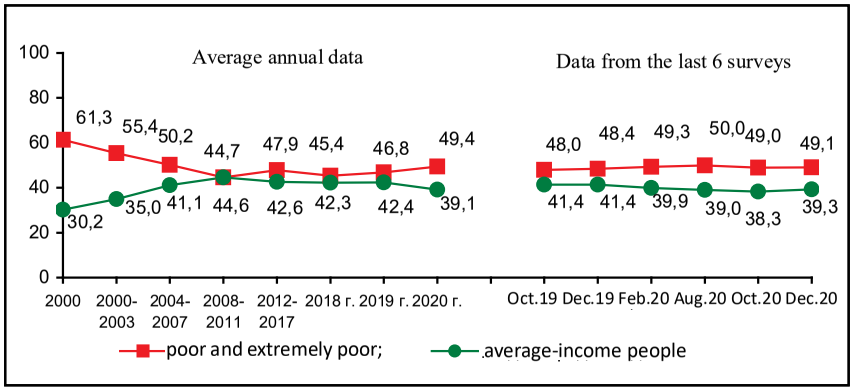

Fig. 2. Social self-identification (Vologda Oblast, VolRC RAS data, % of respondents)*
* Question wording: "What category do you belong to?"

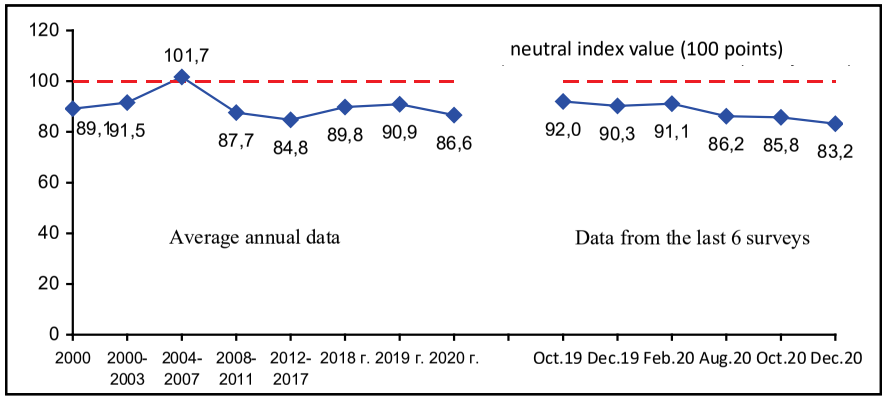

Fig. 3. Consumer Sentiment Index
(Vologda Oblast, VolRC RAS data, in points)

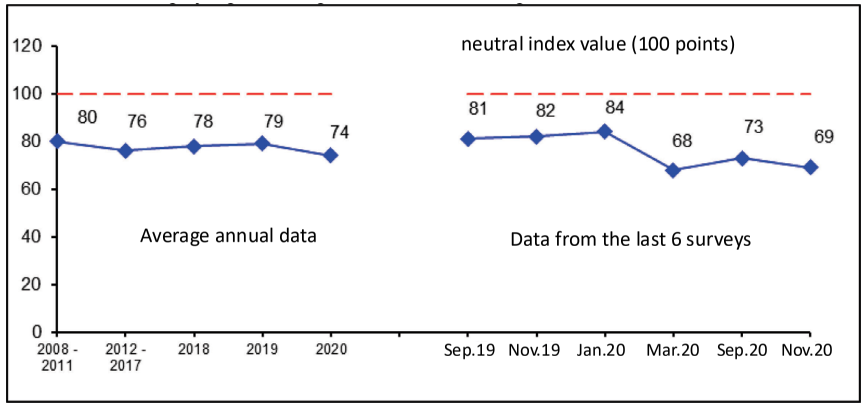

Fig. 4. Consumer Sentiment Index
(Russia, Levada-Center data, in points)

From 2018 to 2020, a share of positive assessements of public attitude decreased by 10 p.p. (from 71 to 61%; *fig.1*); a relative share of "poor and extremely poor" increased by 4 p.p. (from 45 to 49%; see fig.2); Consumer Sentiment Index, reflecting predictions of people in relation to prospects of economic development and their own fianancial situation, decreased by 3 p.p. in the Vologda Oblast (from 90 to 87 p.; see fig.3), in the country in general – by 4 p.p. (from 78 to 74 p.; see fig.4). There are also no positive changes in the short-term dynamics (from October 2019 to December 2020).

"Our country has adopted many legislative acts aimed at combating corruption, as well as national plans and programs on relevant topics, but how far have we progressed in eradicating this evil?...

Despite the fact that someone is detained, arrested, prosecuted, sent to imprisonment places, etc., it is difficult to get rid of an idea that the fight against bribery, kickbacks, budget cuts, and other abuses of authority is **often an imitation.**

To a greater extent, certain progress in identifying the facts of corruption is felt at the "grassroots" level – in relation to representatives of law enforcement agencies, local self-government bodies, military personnel, doctors, teachers, many of whom, as a rule, are engaged in petty bribery... As for dishonest officials, despite the increase of a number of high-profile criminal cases against such people, society does not see this practice as **a full-fledged systematic fight against corruption"**[48].

"Corruption is certainly a problem that needs to be addressed constantly and comprehensively... because we are investing enormous resources towards resolving major national problems and achieving the national development goals. It is essential to ensure the safety and efficient use of these resources[47].

However, despite absolutely correct target goals of the President, many experts have doubts that the fight against corruption in Russia can be called effective, **because "we cannot deal with corruption as long as the country's economic policy is determined by the people who are the beneficiaries of privatization"[49].**

Experts note that even the prosecutor's office does not hide the fact that nearly every official is under a close supervision of the investigative authorities. However, "almost always, after high-profile arrests, the phrase "long-term operational development" is said"[50]. "Skeletons in the closet" mostly come to light only years later, because every corruption case in many cases is a tool of a political game.

This approach to the implementation of the anti-corruption campaign allows us to maintain a certain environment in which, for many years, a violation of the law has been an integral part of "unscrupulous" officials' lifestyle. Over time, this leads to an increase of stolen money, number of people involved, diversity of crime forms, and, ultimately, the extent of consequences from illegal actions of officials (whether it is about state budget, negligence or fictitious performance of official duties, ordinary citizens...). In fact, this is one of the main reasons for such a large-scale spread of corruption in our country.

"Few people know that, in fact, nearly every civil servant with serious power, from heads of large districts and mayors to governors and federal ministers, has an another dossier – so-called "black folder". It contains all their "tricks" close to law violation (sometimes, with specific crimes). In other words, operational information.

However, everything is stored until a specific moment: it is used only when a certain critical event comes – theft gets out of hand, serious increase of public irritation, or an official steps on toes of another influential person"[51].

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[47] Speech of V.V. Putin at the Meeting of the Prosecutor General's Office Board, dated March 17, 2020. O*fficial website of the President of Russia*. Available at: http://www.kremlin.ru/events/president/transcripts/62998

[48] Nazarov E. Fight against corruption or its imitation? *Specialized legal publication, official organ of the Federal Chamber of Lawyers of the Russian Federation "Advokatskaya Gazeta"*. April 19, 2019. Available at: https://www.advgazeta.ru/mneniya/borba-s-korruptsiey-ili-ee-imitatsiya/

[49] Khazin M. Corruption cannot be defeated in Russia now. *Official website of the Izborsky Club*. December 7, 2015. Available at: https://izborsk-club.ru/7909

[50] Nikolaev A. The FSB has been collecting dirt for years: Why officials are "caught" when billions have already been stolen (opinion of S. Reznik). *Tsar-Grad*, October 15, 2019. Available at: https://yandex.ru/turbo/tsargrad.tv/s/articles/kompromat-fsb-sobiraet-godami-pochemu-chinovnikov-berut-kogda-uzhe-ukradeny-milliardy_221740

[51] Nikolaev A. The FSB has been collecting dirt for years: Why officials are "caught" when billions have already been stolen (opinion of S. Reznik). *Tsar-Grad*, October 15, 2019. Available at: https://yandex.ru/turbo/tsargrad.tv/s/articles/kompromat-fsb-sobiraet-godami-pochemu-chinovnikov-berut-kogda-uzhe-ukradeny-milliardy_221740

Chairman of the National Anti-Corruption Committee K. Kabanov: **"The auditor is above any governor and minister.** This is a constitutional position... In general, **Mikhail Men' is some kind of a symbol of the era...** The political level of Men' really increased the rate in the fight against corruption. **This is a huge layer of relations, intra-elite relations. This is very serious"**[52].

Nevertheless, today some experts cautiously say that a real work in the country to bring the system of public administration in order has begun. It is, in particular, associated with the arrest of the former auditor of the Accounts Chamber of the Russian Federation, ex-Minister of Construction and Housing of the Russian Federation, former Governor of the Ivanovo Oblast, Vice-Governor of the Moscow Oblast, and Vice-Mayor of Moscow M. Men'. His detention was approved by the Federation Council on November 18, 2020[53]. Men''s arrest, according to many, is "the strongest blow to the liberals", "a key event", and "not just an ordinary removal "from the run" of "another thief"[54].

Men''s arrest is not the first event after which experts signal about the beginning of a series of long-lasting consequences and political decisions that contribute to the improvement of the public administration system. For example, the arrest of the former Minister of Economic Development of the Russian Federation A. Ulyukaev in 2016. Experts assessed his detention as "indicative "entry" into the group, which includes some vice-ministers and representatives of the Central Bank"[55]. Political analysts noted at the time that "the President urged to fight corruption regardless of people involved[56]. The detention of Ulyukaev is not only a signal about new rules of the game, but it is also an increase of the stakes in the fight for the selection of the development course"[57].

However, a current situation in the country is somewhat different, and it allows saying with more confidence that the President starts decisive actions to nationalize the elites:

– first, examination of the criminal case of M. Men' takes place in the context of a recently resolved issue of the presidential power transit. All-Russian vote on amendments to the Constitution, held on July 1, 2020, removed

"Resignations and appointments **could not take place without the current Prime Minister.** And these changes are quite joyful... If we consider these permutations, we see that they are pragmatic. People, who did not prove themselves, did not show themselves very well, or acted ambiguously, have left. However, they are not thrown on the sidelines but used according to their probable level.

They are replaced by people who have very distinct achievements. Of course, there is something to complain about, but these are all small things... **Mishustin made a very significant step to improving the government's health"**[58].

[52] Ivanov A. A notable blow to systemic liberals. *Zavtra*. November 19, 2020.

[53] According to investigators, "in 2011, Men', being the governor of the Ivanovo Oblast, together with the beneficiaries of the "PRODO" Group of Companies organized a criminal group in order to steal budget funds allocated as a loan from the Ministry of Finance of the Russian Federation to support the Ivanovo Oblast. On Men' instructions, a number of regional regulatory legal acts were adopted, on the basis of which 700 mil. rubles were transferred to OAO "Ivanovsky Broiler" under the guise of loans, which were stolen by the criminal group the next day" (source: Ivanov A. A notable blow to systemic liberals. Zavtra. November 19, 2020).

[54] *Ibidem*.

[55] "The Ulyukaev's case is a signal from Putin". Expert opinions on the high-profile arrest of the Minister (opinion of the head of the Centre for Economic and Political Reforms N. Mironov). Available at: https://pasmi.ru/archive/165073/

[56] *Ibidem* (opinion of the head of the "Political Expert Group" K. Kalachev).

[57] *Ibidem* (opinion of the Director of the Center for Political Studies at the Financial University under the Government of the Russian Federation P. Salin).

[58] Delyagin M.G. Mishustin heals The Government. *Zavtra*. November 10, 2020. Available at: https://zavtra.ru/blogs/mishustin_ozdoravlivaet_pravitel_stvo

a psychological tension (in the public administration system, media, expert community, and among the majority of citizens), giving V.V. Putin a potential opportunity to prolong his presidency until 2030 and even 2036 "if something goes wrong". In other words, today the President has a significant time "lag" in order to make drastic decisions and eliminate any possible consequences;

– second, Men''s arrest, as a "symbol of the era" and a member of particular liberal groups, appeared on the background of significant personnel shifts in the Government[59] and (unlike the Ulyukaev's situation) without the cabinet of liberal ministers under D.A. Medvedev: it happened with the "technocratic" Government of M.V. Mishustin and his active participation. This is a sign that it is not just about some signals to the ruling elites but about specific personnel decisions which are absolutely unrelated to the anti-corruption campaign and go beyond it;

– finally, third, Men''s arrest and the RF Government changes were carried out during the presidential elections in the United States. The winner, J. Biden, visited Russia in 2011 to try to prevent V.V. Putin's third presidential term[60].

It is obvious that the internal state of public administration systems in many countries, if not in the most of them, largely depends on the situation in current (as yet) "hegemons" of global development. This is especially relevant for Russia due to its geopolitical status which, in the context of globalization, is forced, one way or another, to consider events in the camp of the "collective West", as well as due to the "pro-Western orientation" of the ruling elites, which create bank accounts abroad, acquire property, send their children abroad to study, etc.

If we follow this logic, it is reasonable to assume that a potentially more aggressive anti-Russian policy from the United States for the next four or even eight years (until 2028) requires an appropriate internal readiness of the Russian public administration system to defend national interests and conduct independent domestic and foreign policy. Strengthening of the internal readiness for external challenges can only be achieved by strengthening a personnel.

High-profile arrests of representatives at all levels of public power, of course, contribute to the overall "recovery" of the public administration system. However, what is the basis of this process: the "behind-the-scenes games" of the elites or the purposeful actions of the President to solve the problem of nationalization of elites? This question is still open. In any case, so far, these are just encouraging "spot" episodes on the background of a deep, one might say, historical problem that has been existing throughout the entire post-Soviet period.

Turning these "episodes" into a "system" is a primary current goal of the President. Its solution will likely define the future of our country.

* * *

Summing up the results of the entire series of publications, which we started in February 2020, it is worth noting the following:

Throughout all presidential terms (20 years or most of Russia's existence as a post-Soviet state), V.V. Putin has been consistently

[59] "There are 21 ministers in the Government; five ministers were substituted. Including A. Novak who left the post of the Minister of Energy and became the 10th Deputy Prime Minister... New people came to the key economic ministries: Natural Resources and Ecology, Energy, Construction and Housing, Transport, Development of the Far East and the Arctic" (source: Personal responsibility brought ministers to the exit. *Ekspert,* no.47. November 16, 2020. Available at: https://expert.ru/expert/2020/47/personalnaya-otvetstvennost-dovela-ministrov-do-vyihoda/).

[60] Konovalova E., Aleksandrov O. Will J. Biden try to dissuade V. Putin from running for presidency in 2012? *The Moscow Post.* March 4, 2011. Available at: http://www.moscow-post.su/politics/000129922924180/

implementing steps to achieve national development goals, which he spoke about in 1999 ("Russian idea", "strong state", "efficient economy"[61]).

"It is largely due to the long-term neoliberal dominance (surely not without certain variations and deviations) that the domestic economy stumbles in terms of ensuring high GDP growth rates and population's living standards. **Continued prevalence of comprador forces in the structures of economic power could be considered the leading internal threat to the security of the Russian economy.** These unfavorable structural relations should be studied by authorities in order to find root causes of economic primitivization which occurred in Russia and continuing even in the periods of enrichment recession among the oligarchs in combination with growing corruption...

The prevalence of neoliberal theoretical ideas about the "supply economy" due to an inevitable, in this case, extremely slow GDP growth in the economic bloc of the Government and the Central Bank **can permanently remove the domestic economy from the pillar road of human development"**[62].

Russia faced a variety of obstacles on this path: the "Chechen conflict", the global financial crisis of 2008, constant informational pressure from foreign "partners" (in fact, a hybrid war), economic sanctions, the situation in Ukraine, the war in Syria, the coronavirus pandemic... However, step by step, implementing the country's key tasks (recovery of the economy, defense industry, Russia's geopolitical status, civil society, etc.), V.V. Putin has come close to solving the main problem at the end of the fourth presidential term – wide representation of the liberal elites in the public administration system (and, as a result, oligarchic capitalism), which historically emerged in Soviet times and flourished in the globalization era; after the collapse of the Soviet "machine" of public administration, which left behind only one "hegemon" of global development – the United States.

Russian oligarchic capitalism, which was the largest in the world in the mid-2010s, was the main obstacle to the implementation of national goals pursued by V. Putin. It became especially obvious in 2018, when, instead of the "breakthrough development in the level and quality of life" promised to Russians, pension reform and another postponement of the implementation of national projects were "proposed". It was clear that further historical movement of Russia in terms of building a welfare state is simply impossible: no matter where and how the principles of a welfare state were formally stated[63].

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[61] Putin V.V. Russia at the turn of the Millennium. *Nezavisimaya Gazeta*. December 31, 1999. Available at: https://www.ng.ru/politics/1999-12-30/4_millenium.html

[62] Kapkanshchikov S. Pseudo-liberals and statesmen: "The battle of choirs". *Ekonomist*, 2020, no. 10, pp. 67–68.

[63] For reference: as me mentioned in our previous article, "for more than 10 years, despite the stated goals of "concentrating budgetary and administrative resources on improving the quality of life of Russian citizens", "increasing real salaries by 1.4–1.5 times by 2018", "2 times decrease of the poverty level", "implementing breakthrough development of the Russian Federation, increasing the country's population, raising citizens' living standards, creating comfortable conditions for their living, as well as revealing the talent of each person", etc., a number of people with monetary incomes below the subsistence minimum is 12–13%, or about 18–19 million Russians (since 2007). ... At the same time, the dynamics of a number and size of a wealth of dollar billionaires does not actually change, a number of which has increased from 60 to 100 people over the last 13 years (2006–2019), and their capital – from 153 to 275 billion rubles on average per billionaire (source: Ilyin V.A., Morev M.V. Vote of confidence for the President is confirmed. Achievement of socio-economic development goals before 2024–2030 is uncertain. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 4, p. 16,20).

On December 17, 2020, during his annual news conference, V. Putin once again noted that the plan: "by 2030, we need to bring down the share of the population living in poverty from the current 13.5 percent to 6.5 percent" (source: V. Putin's annual news conference. *Official website of the President of Russia*. December 17, 2020. Available at: http://www.kremlin.ru/events/president/news/64671), what actually duplicates one of the goals of 2018 national projects – "two times decrease of the poverty level by 2024".

"The state can be defined as a welfare one only when the solution of an issue regarding reproduction of human life as a biological being, as a potential subject of all types of social activity becomes the main task of the state and institutions of its powers; when there is an established and operating legal system of protecting social interests of a person; when the economy, policy, and society spiritual life is aimed at the solution of social problems.

In this regard, the opinion that a "welfare state" is a state that regulates labor relations, assists low-income citizens, and provides social insurance seems erroneous. **It is too narrow, as it concerns only some aspects of the social sphere.** It makes sense to talk about social functions in this aspect when analyzing social functions of any state – not just a welfare one. When describing a "welfare state" as a type of a state structure, we should talk **about an entire spectrum of social relations, recognizing a priority of social problems**[64].

A critical mass regarding an unsatisfactory quality of the ruling elites and, as a result, the inefficiency of public administration have been accumulating in Russian society for as long as there has been a hypertrophied need for social justice (as sociologists said back in 2012[65]) and the awareness of the need for a comprehensive reform of the public administration system (recorded by scientific studies since 2014[66]).

The reason for such a long "tightening of the knots" is largely caused by the fact that the rigid style of "manual management" of the state, which V.V. Putin chose from the very beginning of his presidency, assumed his leading role as an arbiter and guarantor of the balance of interests of all influential groups among the country's ruling elites, not just within so-called "patriotic bloc".

"Speaking of systemic liberals, it is impossible to "throw" them out of power circles. Even the most ardent patriots and statesmen realize that systemic liberals have a huge influence and connections in the West... Therefore, the fight against systemic liberals should be introduced cautiously, but gradually. Just like in recent years... First, the liberals were completely squeezed out of geopolitics, now they are squeezed out of the economy"[67].

[64] Gurlev A.V. *Human right to a decent life as the main value of a welfare state: Diss... Cand. of Sci. (Law) 12.00.01.* Saint Petersburg., 2001. 174 p.

[65] *What Do Russians Dream of: Ideal and Reality.* Ed. by M.K. Gorshkov, R. Krumm, N.E. Tihonova. Moscow: Ves' Mir, 2013. 400 p.

[66] Petukhov V.V. Dynamics of the social attitudes of the Russia's citizens and making of a public demand for change. *Socis,* 2018, no. 11, pp. 40–53.

[67] Ivanov A. Three groups of systemic liberals in the government. *Zavtra.* December 10, 2020. Available at: https://zavtra.ru/events/tri_gruppirovki_sistemnih_liberalov_v_pravitel_stve_rf

"He [Putin] was the yoke of scales, on which two bowls of ways swung — patriotic and liberal. But, at a certain point, these scales were unbalanced: the patriotic way of life was out of Putin's control, as was the liberal way. The President failed to make the long-awaited breakthrough after the Crimea, a development that would connect these two ways. And everything went its own way. Within each, there was confusion, a complex system of decays"[68].

The culmination of accumulated contradictions occurred in the late 2010s–early 2020s. It was mainly due to the period of transit of "presidential" power, which can be called a political crisis. Not in the sense that the system of public administration is incapable of facing internal and external challenges, but in terms of its transition from one qualitative state to another.

All positive and most important results Russia has achieved over the last 20 years (a new generation of Russians has grown over this time) are associated personally with the President in assessments of public opinion, expert community, and even political establishment of the foreign states. In this regard, "Russia with Putin" and "Russia without Putin" are two different countries in the eyes of its citizens and world community.

According to VCIOM exit poll data[69], we can say that **45% of Russians** who took part in the presidential election in March 2018, **were born in 1983 and later: in 2000, they had not even reached maturity age.**

24% of voters (nearly every fourth one) were born in 1993 and later: in 2000, they were at least 7 years old, and, consequently, almost all of their adult life took place in the period after the "wild 90s" – during the presidential terms of V.V. Putin.

V.V. Putin's actions at this climax of the political crisis, as we can see, are quite consistent with his established reputation as a strategist who "plays in a long term". He took full advantage of offered opportunities by making drastic and long-lasting decisions; steps designed not only to overcome the existing crisis of presidential power, but also to ensure the further development of the Russian statehood.

Personnel changes in the Government (including a change of the Prime Minister), initiation of the new Constitution with deep social and national focus, and "organizational" provision of his presidential terms as the guarantor of the continuation of the selected (supported by Russians over the past 20 years) course: all of this gives reasons for cautious optimism for the future.

Especially if you understand that the potential of each of these steps has not yet been fully realized:

✓ for now, M. Mishustin's Government fights mostly consequences of the pandemic (but even now we feel how information technologies start to develop, and recent changes among ministers shows that his personnel is a dynamic process, where a place of each official depends on the efficiency of fulfilling responsibilities taken);

[68] Prokhanov A. I see Putin's problems, his drama. *Zavtra*, 2020, October 13. Available at: https://zavtra.ru/blogs/ya_vizhu_problemi_putina_ego_dramu

[69] VCIOM named an average age of the majority of people who voted in the elections. *RIA-Novosti.* March 18, 2018. Available at: https://ria.ru/20180318/1516645631.html

✓ the potential of the Constitution is designed for decades; it sets the general vector of society's historical development, and it should be evaluated exclusively from the civilizational and historical positions;

✓ finally, possible 5th and 6th presidential terms of V.V. Putin is time which could be spent organizing a systemic work focused on national interests (not episodes motivated by internal political processes) and aimed at increasing the quality of the ruling elites.

It is very important that the President has enough political will to finish the process of the elites nationalization, so that possible force majeure circumstances, such as the coronavirus pandemic or any interventions from the "collective West" (which are still difficult to predict), will not have a significant impact on his actions to resolve the main (perhaps even the last unresolved) issue – **to achieve such quality of the ruling elites that will accelerate Russia's civilizational movement toward being a strong and independent state, achievement of national development goals, which realize the needs of Russian society for social justice and a decent quality of life**.

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SOCIO-ECONOMIC DEVELOPMENT STRATEGY

DOI: 10.15838/esc.2020.6.72.3
UDC 339.9:38.2, LBC 65.59:65.050:65.049

The Impact of Foreign Economic Activity on Regional Development: Comparative Analysis of Russian and Foreign Experience

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For citation: Lavrikova Yu.G., Andreeva E.L., Ratner A.V. The impact of foreign economic activity on regional development: comparative analysis of Russian and foreign experience. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 54–67. DOI: 10.15838/esc.2020.6.72.3

Abstract. Global economic challenges, along with a slowdown in the world economy growth, lead to the need to consider foreign economic activity (FEA) as a factor affecting regional development. Due to non-resource exports, both quantitative (increasing the exports volume, employment, investment inflows, tax base) and qualitative tasks (diversifying the economy, increasing competitiveness and innovation, production of high-value products) are solved. In this regard, a scientifically based assessment of the FEA role in the regional development strategies is relevant which can be the basis for developing a set of mechanisms and tools for the region's foreign economic development. The purpose of the article is to substantiate the FEA development impact on the regional development by identifying the reflection of its prospects in the development strategies of Russian regions and different countries' regions. The object of the research is FEA of the selected regions of the Russian Federation, developed countries (Germany, USA), and EAEU countries (Belarus and Kazakhstan). The scientific novelty is to identify the relations between the degree of economic development and FEA countries, and the reflection of promising areas and tools for the FEA development in the development strategies of their regions. The methodological base is represented by the approaches to defining the determinants and principles of FEA support. There were included the following methods: an indicators' comparative analysis of the economic and FEA development levels of the selected countries and the prospects for the FEA development (in areas, including export of services; non-resource export; export diversification; etc.) in their regions' strategies. The analysis results confirmed the assumption that the reflection of the directions and tools of FEA development is paid attention to both in developed and developing economies, but different countries have their own specifics. The analysis allows taking into account the experience of developed countries and leading exporters, as well as the EAEU members, when working out individual strategies and program documents of the regions in the FEA field.

Key words: foreign economic activity, region's development strategy, experts support, development priorities, non-resource export, investment attractiveness, diversification of the economy and export.

Introduction and problem statement

The foreign economic activity (FEA) development are important in the Russian Federal strategic and program documents which is, accordingly, reflected in regional development strategies. The national project "International Cooperation and Export" (2018–2024) was accepted at the federal level, and in accordance with it, the Regional Export Standard (2017) according to which the reflection of the strategic prospects for the FEA development is being further worked out in a number of regions, including in the form of developing separate FEA strategies. Notably, different countries have accumulated experience in FEA supporting, including those in terms of volumes and exports structure, attracting foreign investment. This makes it relevant to compare different countries' experience in developing a strategic vision for the FEA development at the regional level.

The purpose of the research is to substantiate the FEA influence on the regional development by identifying the reflection of its prospects in the development strategies of Russian regions and different countries' regions. The object of the research is the regions' FEA of the countries different by economic characteristics (Russia and EAEU countries, developed countries); the subject is the nature of its reflection in the regional development strategies. The tasks are:

– to analyze the economic and FEA development level of the selected countries and

regions, in order to define the reflection determination of the FEA development prospects in the regional strategies;

– to analyze the reflection of strategic prospects for the FEA development in regional documents, in the case of Russia and its trading partners, in order to identify international differentiation for different countries' regions.

The hypothesis is the assumption that the reflection of the directions and tools of FEA development has its own specifics in the countries with different FEA development levels.

The theoretical bases of FEA support at various levels are developed in both domestic and foreign scientific literature. In particular, the formation determinants of a system of forms and tools for FEA supporting are:

– external determinants of the need to stimulate exports: competition, turbulence and downward development of the world economy during which commercial banks were leaving export financing [1, pp. 34, 38]; international economic sanctions [2, p. 96];

– internal determinants of the need to stimulate FEA: increasing exports role for countries, including to support strategic industries, the need to replace imports through localization [1, pp. 34, 38];

– determinants of the specific content of the support system: export, investment and production indicators [3, pp. 247, 251–252]; comparative production costs [4, pp. 330–332]; external and internal barriers for exporters; sectoral and geographic export priorities, priorities of sectoral national projects [2, p. 98]; the enterprises' needs in the country (region), determined by their specialization, strengths and weaknesses, and potential [5, p. 599], etc.

It is also possible to systematize the principles of building FEA support system highlighted in the literature, directly following from the determinants of the specific content of the support system:

– orientation relevance of FEA support to innovative-active enterprises [6, pp. 23–24; 7, p. 75], as for the countries, the sale of high-tech goods is relevant;

– necessity to stimulate investment for the exports development of highly processed goods [8, p. 5–6];

– companies' need for export support: financial (preferential financing (including SEZ), insurance, guarantees (including leasing [9, p. 92]) because in financial terms, exports are more vulnerable than domestic sales [10, p. 2]); informational and analytical (informing about the international market situation, best practices, support opportunities); consulting (training in export techniques [11, p. 4]); organizational (exhibitions, business missions) [12, pp. 19, 21–24; 13, p. 2]; building relations with countries-partners [2, p. 104; 14, p. 2; 15, p. 27], characteristics of their business cultures [16, p. 125] to support projects at any stage [17, p. 65]. The reflection of FEA support directions in development strategies is analyzed [1, pp. 34–37], as a rule, only at the national level;

– relevance of stimulating the export of small and medium businesses [6, p. 23]. The success determinants are the presence of export competencies, the ability to assess their capabilities and market needs [12, p. 172; 14, p. 2; 16, pp. 124–125]. Namely, there are the following different types of approaches to support exporters: assistance to export processes and the environment for them, assistance to export entities [2, pp. 99, 101]; creating conditions to implement FEA by the companies [11, p. 3];

– relevance of combining and coordinating the efforts of various national export support institutions [16, pp. 131–133; 19, p. 64];

– importance of placing export support structures of the country (region) not only inside, but also abroad [4, pp. 332–333; 16, p. 130];

– formation relevance of a network system to support the country's export, taking into account regional differences in export potential [19, p. 59]; account of the need to develop externally oriented growth poles [20, p. 98].

– importance of the dialogue between the state and business for solving the FEA problems [4, pp. 332–333; 12, p. 19].

Thus, the variety of determinants and the system of state FEA support principles is high. At the same time, it is still relevant to compare the general foreign economic parameters of the countries and their regions with building a strategic vision of the prospects and directions of FEA support at the regional level.

The scientific novelty and significance of the work is to identify the relationship between the degree of the countries' economic and FEA development, and the vision reflection of promising directions and tools for the FEA development in the growth strategies of their regions.

Research methodological support

A comparative analysis is carried out on the example of several regions of Russia and countries, its leading trade and economic partners:

– far-abroad countries, developed economies and leading exporters, including in terms of non-resource (high-tech) exports (Germany and USA);

– near-abroad countries (EAEU partners that are Kazakhstan and Belarus) which, like Russia, are developing economies.

The authors consider the regions that are actively engaged in foreign economic activity. Namely, Russia's regions were selected implementing the Regional Export Standard: border and coastal western (Kaliningrad Oblast) and eastern (Primorski Krai) regions and Russia's middle region (Sverdlovsk Oblast), acting as a connecting "bridge" between west – east and north – south. Also in the case of Germany, the USA, and Kazakhstan, the border regions were taken, first of all for which FEA is an organic part of economic activity.

The selected regions occupy leading or significant positions in the country in terms of export volumes: Texas is the 1st in the USA (along with Florida, one of the largest by population), North Rhine–Westphalia, the 2nd in Germany (along with Bavaria, the largest by GRP), the Atyrau Oblast, the 1st in Kazakhstan (also taken "middle" Karaganda, 4th by GRP), the Minsk Oblast, the 2nd in Belarus, the Sverdlovsk Oblast, the 7th in Russia (also taken the 4th by import, the Kaliningrad Oblast and the 1st in the far Eastern Federal district by export, Primorski Krai) *(Tab. 2, 3)* which once again confirms the scientific interest to these regions' strategies in FEA terms.

In order to define the determination of the reflection of the FEA development prospects in the regional strategies, an analysis of the countries' economic development level was carried out by comparing GDP and GDP per capita, and an analysis of their FEA development level by comparing the exports volume, including high-tech and foreign direct investment (FDI) inflows and their ratios to GDP; as well as an analysis of the economic development level, and FEA development of the selected regions of these countries with an additional emphasis on the exports and FDI inflows structure.

When analyzing the FEA sphere reflection in the regions' strategies for the purpose of identifying international differentiation in the reflection, only development measures related

to FEA were taken into account, i.e.: exports, attracting foreign investment and international cooperation, international tourism, international transport and transit potential, international competitiveness of production facilities in the region.

When choosing parameters for research, it is advisable to proceed from what parameters are relevant in terms of the long-term FEA development. The parameters relevant to the Russian economy are determined based on the relevant Federal documents. Thus, among the tasks of the state program of the Russian Federation "FEA development" is the formation of a state regulation system that takes into account the changed world economic conditions. The national project "International Cooperation and Export" covers such areas as industrial export, agricultural products export, international trade logistics, services export, and systematic measures for the international cooperation and export development. The project is aimed at orienting industrial and trade policies to achieve international competitiveness of domestic goods and services, ensuring their demand on the international market.

Thus, given the relevance of the non-resource exports development, exports diversification, and the development of services exports, indicated in the Russian Federal documents of strategic economic development, covering FEA, it is advisable to analyze the reflection of the FEA development in the regional documents of strategic development according to the following parameters:

– what FEA areas are paid attention to;
– high-tech and innovative exports development;
– services export development;
– incentives and opportunities to support FEA;
– classifying the FEA development as one of the main priorities of the region's development;
– tools for export development (FEA);
– production and exports diversification.

Results: analysis of the FEA development level as determinants of its reflection in the regional development strategies

Economic analysis of the Russia's development degree and selected national economies, and development levels of their foreign trade shows that the Germany's GDP volume is twice ahead of Russia, and Russia in turn, is ahead of Kazakhstan, and it times ahead of Belarus *(Table 1)*.

GDP per capita at PPP gap between the USA and Germany is small, the two countries almost doubled ahead of Russia which is comparable to Kazakhstan, and together they are ahead of Belarus.

If in terms of the total exports volume, the United States is also not much ahead of Germany, then the second country has a much stronger position in the export of finished goods and vehicles, and equipment, in particular. Germany also has higher export intensity than the USA, but Belarus has the highest (more than half of GDP). Also, in terms of the share of FDI to GDP, the Russian Federation, Belarus and Kazakhstan have a higher indicator than the USA and Germany which also indicates both the FDI importance and active measures taken in the countries to attract them. In terms of absolute FDI inflows, Russia is even comparable to Germany. Thus, in terms of GDP and exports, the USA and Germany can be characterized as the most developed, Russia – as the median, Kazakhstan and Belarus – as developing economies. The lead in a number of relative indicators can also be explained by the fact that Germany and the USA have already reached a high economic and FEA

Table 1. Economic and FEA development level of the countries, 2019

	USA	Germany	Russia	Kazakhstan	Belarus
GDP, bill.US dollars	21374	3846	1700	180	63
FDI inflows (net), bill. US dollars	254	36	32	9	1
Export, bill US dollars	1643	1489	420	57	33
Export of cars, equipment and vehicles, bill. US dollars	535	716	22	1	5
Export of finished goods, bill. US dollars	1 023	1 262	80	8	19
Export of highly qualified and technically intensive industries, bill. US dollars	496	430	30	3	7
Export of electronic and electrical products, bill. US doll.	190	135	6	0.2	0.7
GDP per capita, PPP, thsd. US dollars	65.1	56.1	29.2	27.4	19.9
Export / GDP	7.7%	38.7%	24.7%	31.8%	52.3%
FDI inflows / GDP	1.2%	0.9%	1.9%	4.7%	2.0%
Export of cars, equipment and vehicles / GDP	2.5%	18.6%	1.3%	0.6%	8.6%
Export of finished goods / GDP	4.8%	32.8%	4.7%	4.2%	30.0%
Export of highly qualified and technically intensive industries / GDP	2.3%	11.2%	1.7%	1.6%	11.5%
Export of electronic and electrical products / GDP	0.9%	3.5%	0.3%	0.1%	1.1%
Calculated on the basis of the data of the UNCTAD, World Bank. Available at: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx; https://databank.worldbank.org/source/world-development-indicators (Accessed: November 5, 2020).					

development level, and developing countries are demonstrating a stage of their active development. This is confirmed by the adoption of strategic documents on export development in Russia, Belarus and Kazakhstan. Russia has adopted the national project "International Cooperation and Export" (for 2018–2024), the State Program "FEA Development", the Strategy for the development of services export up to 2025, in Belarus is the National program for support and development of exports for 2016–2020[1], in Kazakhstan – "National Export Strategy" program for 2018–2022[2].

The Russian national project "International Cooperation and Export" covers such areas as industrial and agricultural export, international trade logistics, export of services and systemic measures for the international cooperation, and export development. The tasks set in the program of Kazakhstan relate to the spheres of institutional support for exporters, financial and non-financial measures to support exports, the services export development, etc. and services, promoting "export culture", etc.

An analysis of the economic and foreign economic development level of these countries' regions largely confirms this picture: in terms of GRP and exports, the regions of developing economies are incomparable with the regions of developed ones *(Table 2)*. This reflects the fact that in terms of exports, regions of developing countries are in the evolution stage. Although the export intensity of their GRP is hardly inferior to the regions of the USA and Germany, export per capita in most cases (except the Atyrau Oblast, where half of it is provided by the extraction of mineral resources) is significantly inferior. All of the considered regions are characterized by the representation of industry in the GRP and of non-primary exports.

If the American and German regions have a large share of final finished goods, including engineering products, then food, metallurgy, and mineral products, and only after them

[1] Export Strategy of the Republic of Belarus. Available at: http://www.government.by/upload/docs/fileaff83a3fc04eb9c0.PDF (accessed: February 28, 2020).

[2] Export Strategy of Kazakhstan, Information and legal system of normative legal acts of the Republic of Kazakhstan. Available at: http://adilet.zan.kz/rus/docs/P1700000511#z19 (accessed: February 28, 2020).

Table 2. Indicators of the economic development and export level of the regions, 2019

Country, region		GRP		Export			
		bill. US dollars	share of industry[2], %	bill. US dollars	to GRP	per capita, thsd. US dollars	Basic groups (share)
USA	Florida	963	99%	56.0	6%	2.6	manufacturing products (73%)
	Texas	1764	84%	330.5	19%	11.4	manufacturing products (57%)
Germany	North Rhine-Westphalia	796	22%	216.9	27%	12.1	finished goods – 61%, intermediate goods – 21.3%, raw materials – 0.9%
	Bavaria	709	27%	212.6	30%	16.2	automobile (29.8%), electrical products (18.1%), machinery and equipment (17.6%), chemical products (9.8%)[1]
	Saxony	143	23%	45.1	31%	11.1	engineering products (11.9%), electrical products (12.4%), auto (30.8%)
Russia	Kaliningrad Oblast	7.4[1]	23%[1]	1.5	17.2%[1]	1.5	food products and agricultural raw materials (79%)
	Sverdlovsk Oblast	36.4[1]	33%[1]	8.3	23.5%[1]	1.9	metals and products (55%), machinery and equipment (17%), chemical products (14%)
	Primorski Krai	13.3[1]	9.5%[1]	4.1	25.6%[1]	2.1	food products and raw materials (39.4%), engineering products (24.1%), mineral commodity (18.2%), FEC (16.3%)
Kazakhstan[1]	Atyrau Oblast	22.7	91%	23.9	105%[3]	37.7	mineral products (52.2%), engineering products (16.9%); plastics and rubber products (7.6%)
	Karaganda Oblast	13.7	53%	4.6	34%	3.3	metals and products (44.3%), precious (semiprecious) stones and precious metals (31.0%), plastics and rubber (18.6%), machinery and equipment (8.5%)
Belarus	Minsk Oblast	9.9	43%[1]	7.4	75%	5.1	chemical products (46%); equipment and vehicles (22.5%); agribusiness(15.3%)

[1] 2018.
[2] USA – (all industries, except the primary sector) / GRP; Germany– (industrial production [except construction]) / GVA; Russia – manufacture / GVA; Kazakhstan – manufacturing products / GRP; Belarus – manufacturing products (except construction) / GRP.
[3] >100%, it may be related with the export of stocks and the difference in internal and external prices.
According to the calculations based on data of the National Statistics and countries' authorities (https://www.bea.gov/system/files/2020-02/trad1219.pdf; statsamerica.org; www-genesis.destatis.de; destatis.de; statistikportal.de; bundesbank.de; http://stat.customs.ru/apex/f?p=201:7:2073617274463687::NO:::; rosstat.gov.ru; utu.customs.ru; koblt.customs.gov.ru; dvtu.customs.gov.ru; cbr.ru/statistics/macro_itm/svs; https://stat.gov.kz/edition/publication/collection; bsbnb.nationalbank.kz; belstat.gov.by/ofitsialnaya-statistika/; minsk.belstat.gov.by; nbrb.by [accessed: March 5, 2020, November 3, 2020]).

engineering products are dominated in Russian, Kazakh, and Belarusian regions *(Tab. 2)*. Thus, the regions of developed countries in the per capita dimension are "saturated" with exports, and their exports are saturated with high – tech products. In terms of foreign investment inflows, the regions of developed countries, as well as in terms of absolute exports, are incomparably ahead of the regions of developing countries. In the per capita dimension, the Sverdlovsk Oblast stands out, demonstrating the stage of active attraction of foreign investment *(Tab. 3)*.

Results: FEA reflection in regional strategies

Land development plans (programs) are being developed in Germany's regions. As the initial analysis showed, FEA is not subject to detailed consideration in these programs, so it is advisable to consider the programs of several regions to get a more complete picture *(Tab. 4)*.

Table 3. Other indicators of FEA development level in the regions, 2019

Country, region		Export		Import			FDI inflows[5]	
		share in the country	place in the country	bill. US dollars	share in the country	place in the country	bill. US dollars	per capita, thsd. US dollars
USA	Florida	20.1%	1	295	11.8%	2	10.5[3]	0.5[3]
	Texas	3.4%	8	82	3.3%	10	8.4[4]	0.3[4]
Germany	North Rhine Westphalia	14.6%	2	275	22.2%	1	6.8[3]	0.4[3]
	Bavaria	14.3%	3	213	17.2%	2	8.6[2]	0.7[2]
	Saxony	3%	8	30	2.4%	9	1.3[3]	0.3[3]
Russia	Kaliningrad Oblast	0.4%	34	8,0	3.3%	4	0.3	0.3
	Sverdlovsk Oblast	2.0%	7	5.0	2.1%	7	5.3	1.2
	Primorski Krai	1.0%	21	5.2	2.1%	6	0.4	0.2
Kazakhstan[1]	Atyrau Oblast	39%	1	3.2	9.6%	3	0.6	1.0
	Karaganda Oblast	7.5%	5	1.8	5.4%	5	0.5	0.4
Belarus	Minsk Oblast	23.3%	2	6.1	16.8%	2	0.6	0.4

[1] 2018; [2] 2017; [3] 2016; [4] 2015.
[5] In Germany – net; in Kazakhstan – DI in the fixed capital, in Belarus – FDI in the real sector; in Texas– «greenfield» FDI projects.
According to the calculations based on the data of the National Statistics and countries' authorities (sources to the Table 2, and: flchamber.com; gov.texas.gov; deutschlandinzahlen.de; standort-sachsen.de; it.nrw; stmwi.bayern.de [Accessed: November 3, 2020]).

Table 4. FEA reflection in the strategic development documents in Germany's regions

Region (document, year)		FEA features and their illustration
North Rhine-Westphalia (land development plan from 2016)[1]		The relevance of the transport infrastructure development, integrated into the European traffic network and other cross-border transport links in the border areas was noted. The corresponding significant routes are marked. The region is also positioned as a European "Metropolregion" (regional agglomeration). It is noted that it has the prerequisites to be an internationally recognized location for activities in various fields (infrastructure, services, research and development, economy, science, tourism), and these prerequisites are promising to develop. The importance of cross-border joint work in the field of spatial development with neighboring Netherlands and Belgium is noted.
Bavaria	(region's development program from 2013 (edited in 2018)[2]	As the region is a border region, it is noted that when coordinating spatial development strategies, cooperation with EU countries and cross-border development strategies should be taken into account. Attention is paid to the positioning of Bavaria as a European "Metropolregion" (regional agglomeration). Attention is paid to the tourism sector development.
	(plan „Bayern Digital II", from 2017)[3]	It is planned that the region will become a leading location for digital medicine and care for the elderly.
Saxony (land development plan from 2013)[4]		The goals include, among other things, strengthening the competitiveness of the region's economy through guaranteeing and improving spatial conditions. There is the importance of: integration into TRANS-European transport corridors (meridian and latitudinal); international economic cooperation (including in the framework of Euroregions with neighboring Polish and Czech territories); performing the function of a "bridge" between the "new" and original EU members; supporting the development of border territories located in cross-border "tourist regions".

Sources: [1] Landesentwicklungsplan Nordrhein-Westfalen (von 2016) // Landesregierung Nordrhein-Westfalen. Available at: https://www.wirtschaft.nrw/sites/default/files/asset/document/lep_nrw_14-12-16.pdf; [2] Landesentwicklungsprogramm Bayern vom 01.09.2013 (Stand 01.03.2018). Available at: http://www.landesentwicklung-bayern.de/fileadmin/user_upload/landesentwicklung/Dokumente_und_Cover/Instrumente/LEP_Lesefassung_2018/LEP_Stand_2018.pdf; [3] Bericht aus der Kabinettssitzung vom 30. Mai 2017 // Bayrisches Landesportal. 30.05.2017. Available at: https://www.bayern.de/bericht-aus-der-kabinettssitzung-vom-30-mai-2017/?seite=1579; [4] Landesentwicklungsplan // Sächsisches Staatsministerium für Regionalentwicklung. Available at: https://www.landesentwicklung.sachsen.de/2387.htm (accessed: February 5-19, 2020).

Germany has a well-developed system of export support [1, pp. 34–35; 2, pp. 102–104], but, as the research shows, the FEA development is covered only slightly in the reviewed regional development documents, at least to a lesser extent than in the Russian regions. In FEA terms, importance is given to cross-border and international transport infrastructure and tourism. The article demonstrates that this is largely due to the fact that most of the regions in Europe are border regions, as well as to the desire to develop economic connectivity within the European Union.

Against the background of competition between economic activity "locations" in the context of developing European integration and globalization, much attention is paid to the international competitiveness issue. So, this is given attention in the development plans of North Rhine-Westphalia and Saxony. In the case of North Rhine-Westphalia, the region's agricultural development strategy also focuses on international competitiveness.

In the case of Bavaria (border region), it is noted that spatial development planning should take into account the "European Concept of Spatial Development", macro-regional strategies, European strategies for the Danube area, Operational programs of European cooperation with Bavarian participation.

Thus, the German regions pay great attention to the following aspects:

– international competitiveness, and region's development as one of the most significant and attractive places of economic activity in the European Union and in the world;

– transport infrastructure development, including cross-border, including taking into account European transport routes;

– economic cooperation and harmonization of spatial development with neighboring territories of the countries, space economic connectivity, including taking into account European conceptual provisions and spatial development plans which is obviously due to integration;

– high-tech economy development (for example, in the case of Bavaria – in the land digitalization strategy).

As for the US regions, although the literature notes the development of export promotion programs by the USA [4], the general development strategies presented in the free publication were taken as the examples. In the case of Florida, the plan includes support for export promotion, but special emphasis is placed on the investment attractiveness and competitive advantages of the region.

These examples of the development strategies of the US regions *(Tab. 5)* show that much attention is paid to favorable conditions for the entrepreneurship development. Thus, in the US regions, special emphasis is placed on such aspects as:

– export promotion and its diversification through assistance of products to foreign markets (exhibitions), marketing support;

– development of the region's competitiveness and attractiveness for investors, including foreign ones and entrepreneurs who may have an export-oriented business. The institutional business environment is characterized, and incentives for its innovative development are noted.

In the Russian, Kazakhstan and Belarusian regions, the FEA development is considered in the strategies in more detail *(Tab. 6*) than in the developed partner countries, and we should note that Russian entities have specialized FEA strategies. Their strategies reflect the following aspects to varying degree:

– FEA development is considered as the ways to achieve the goals (Russia, Kazakhstan), tasks and directions within the priorities (Belarus);

Table 5. FEA reflection in the strategic development documents in USA regions

Region (document, year)	FEA features and their illustration
Florida (strategic plan of economic development for 2018 – 2023)[1]	One of the directions of development is to stimulate export growth and market diversification, in particular, through the international trade exhibitions of the "Enterprise Florida" organization. The regional program for promoting agricultural products is supposed to support producers in participating in exhibitions, product presentations, and marketing support in different regions of the world. It is noted that the state occupies the second position in the annual rating "Best state for business" of the Chief Executive Magazine. There are incentives for doing business, including benefits, infrastructure, trade advantages, and the availability of competent business planners. It is planned to continue upgrading regulatory systems to match the global, innovation-oriented economy. It is planned to improve the work on issuing business permits, develop a convenient service for business, and a predictable institutional environment.
North Central Texas (complex economic development strategy from 2016)[2]	The relevance of supporting the formation and growth of export-oriented business which is one of the sub-goals in the framework of the purpose of developing the region's economic competitiveness is noted. For one of the clusters in the region, the possibility of attracting foreign direct investment is noted as an opportunity. Also, great attention is paid to increasing the region's attractiveness for business by supporting the acquisition of business competencies and access of enterprises to the necessary resources (including through small business development centers, accelerators, incubators).
Sources: [1] Department of Economic Opportunity. Available at: http://www.floridajobs.org/office-directory/division-of-strategic-business-development/florida-strategic-plan-for-economic-development; [2] North Central Texas Council of governments. Available at: https://www.nctcog.org/nctcg/media/EDO-DOCS/EconomicDevelopmentDistrict/NCTCOG_CEDS.pdf (accessed: February 5-19, 2020).	

Table 6. FEA reflection in the strategic development documents in the selected regions of EAEU countries

Region (document)	FEA reflection
RUSSIA	
Sverdlovsk Oblast (Strategy of International and Foreign Economic Relations up to 2035 (from 2019))[1]	There is a detailed analysis of the region's FEA and market conditions, promising types of goods with a focus on the high-tech export development, existing infrastructure to support attracting foreign investment (SEZ, technoparks, industrial parks) and achievements, transport infrastructure, infrastructure for developing the region's image abroad ("Innoprom" exhibition, etc., the region's brand), analysis of the region's competitive advantages, consulting infrastructure. The purpose is to create an environment in which companies would have optimal conditions for export; increase GRP due to this and by attracting foreign investment. Tasks are set in such areas as the international cooperation development in the region and increasing the presence of companies in the foreign market; diversification of the industry structure of exports, including increasing the high-tech exports share, developing exports of services; assistance in attracting foreign capital to high-tech sectors; necessary import of advanced industrial equipment; development of export support infrastructure; transport infrastructure development; development of the region's image abroad. The mechanisms for implementing the strategy in achieving the purposes are presented.
Kaliningrad Oblast (Strategy for ensuring favorable conditions for the export activity development up to 2025[2])	The analysis of the development, barriers and prospects for the development of exports in the region (especially non-raw materials), including industry and geographical ones, is presented. The purpose is to ensure the implementation of an effective pattern of the region's export specialization which allows the region to develop harmoniously, taking into account its specifics and advantages. Special attention is paid to the technological growth of export industries, including through the use of advanced technologies and new materials, the agricultural industry development, the service sector (tourism, transport), and mechanical engineering (including through the localization of foreign production). The tasks are to provide opportunities for exporters to overcome external and internal barriers, to consolidate the efforts of the state and business in the field of export diversification, to invite businesses (including small and medium businesses) to export, and to ensure an effective export support system. The following export support mechanisms are presented: financial, information and consulting, market entry, increasing export readiness, and regional system of assistance institutions.
Primorski Krai (section on FEA in the socio-economic development strategy up to 2030[3])	The analysis of the region's FEA development trends is presented, and the turnover forecast is estimated. Special attention is paid to the service sector (transport and transit, tourism, medical, etc.), agriculture and the forest industry. The advantages (including the availability of PSEDA and FPV), difficulties in developing exports and attracting FDI, ways to solve them, and promising areas for export development and localization are presented. The importance of increasing the degree of raw materials processing is emphasized. The purpose of FEA development is to increase the region's non-resource exports, develop international transport services, and attract FDI.

End of Table 6

Region (document)	FEA reflection
KAZAKHSTAN	
Atyrau Oblast (program of the territory's development of the region for 2016–2020)[4]	Among the ways to achieve the purpose of developing innovations and stimulating capital inflows are the active implementation of non-resource exports (it was noted that roadmaps have been developed to support export-oriented enterprises; the export-oriented industry development is also a part of the purpose of the region's agro-industrial complex developing) and attracting direct investment in high-tech production; organization of investment forums and exhibitions (there're mentioned the annual investment forum "Atyrau invest", North Caspian regional exhibitions and construction exhibition "Atyrau Build"), presentations, business meetings, publication of brochures (including for foreign audiences) to increase the investment attractiveness of the region; organization of seminars on the requirements of international markets and the regulatory framework of Kazakhstan's foreign trade; support in the implementation of new technology investment projects; creation of trade and logistics centers; support for cooperation with foreign technology parks.
Karaganda Oblast (development program for 2016–2020)[5]	The planned increase in the share of non-resource exports and growth in exports of number of sectors (ferrous, nonferrous metallurgy, non-metallic mineral products, manufactured products). Among the ways to achieve these target indicators are the implementation of investment projects in priority industrial sectors, the introduction of technologies in manufacturing. In the field of investment, it is planned to select projects for the regional Technopark and SEZ ("Saryarka"), organize events to attract investors, and implement high-tech projects with innovations. In agriculture, it is planned to combine the activities of small business entities, including for entering the foreign market.
Belarus	
Minsk Oblast (sustainable development strategy for 2016–2025)[6]	Among the development priorities: a competitive tourism sector development, transit potential, the agro-industrial complex competitiveness, development of the industrial complex on an innovative basis. The tasks are in attracting foreign investment, international marketing (promotion of tourism services, strategizing the entry of private agribusiness in the world market of environmentally friendly and new products, diversification of exports [AIC] including accurate accounting of requests), achieving compliance with international quality standards (AIC), deepening the specialization, the formation of the list of promising plants with the latest technological structures.

Source: [1] https://mvs.midural.ru/sites/default/files/20190628pp372.pdf (accessed: October 10, 2019); [2] minprom.gov39.ru/upload/2018_07_19_Приказ+экспортная%20стратегия_Итог.pdf; [3] https://www.economy.gov.ru/material/file/d02f9629c0feccf90a6449ae4647e72c/strategprimorsk.pdf (accessed: November 2, 2020); [4] http://atyrau.gov.kz/page/read/Programma_razvitiya_territorii.html?lang=ru; [5] http://econom-krg.gov.kz/ru/prt_obl; [6] http://www.pravo.by/upload/docs/op/C21600604_1470690000.pdf (accessed: February 5-19, 2020).

– the analysis of the region's economy is carried out in terms of FEA potential, its achievements and factors (problems and development prospects);

– a number of FEA directions is reflected: development of the competitive industrial sector, agro-industrial complex, transport and transit potential, tourism sector, and attracting foreign investment;

– high-tech industry development plays a special role that is competitive on the international market;

– FEA is to diversify production and exports which will help reduce dependence on the conjuncture of world commodity markets, as well as on sanctions restrictions in a number of developed countries;

– there provides tools for infrastructural support of export-oriented production (SEZ, technology parks), product promotion in foreign markets (exhibitions), attracting foreign investment (presentations, forums).

Thus, the Russian, Kazakhstan, and Belarusian regions focus on developing non-oil exports through the efforts in both the sphere of technological production and marketing, and on attracting foreign investment as an important tool for the export-oriented production development. It is obvious that such a detailed FEA development in strategic

development documents reflects the special importance for developing countries of stimulating non-resource exports in the context of global technological and trade competition and other challenges in the development of world economic relations. An important determinant is the relatively lower (as regards to developed countries) level of economic development and FEA and, at the same time, being at the stage of active development.

Conclusion

The research showed that non-resource exports and attraction of foreign investment and technologies play a significant role in the regions' development strategies of both developed and developing countries. It is common for countries to take into account the industry specifics of the region in the reflection of their foreign economic prospects. At the same time, the regional FEA development patterns in different countries are built variously. In particular, the degree of detail of the reflection of strategic FEA development directions differs which is related to the economic development and FEA level which confirms the hypothesis.

The United States and Germany are the world's leading exporters, including high-tech goods, have reached a high economic and FEA development level; their regions' economies in per capita terms are more "saturated" with exports and foreign investment, and their exports are more "saturated" with high-tech products. Some of the issues of FEA development that are put on the agenda in the strategies of developing countries' regions, in particular, the development of non-resource non-energy exports and export diversification, are not so relevant in the case of developed countries. In this regard, in the general development strategies of these regions, the FEA coverage is characterized by a lower degree of detail. The non-resource production base is already developed, and the current issue on the agenda is how to maintain or strengthen global competitiveness by improving the business environment. When FEA supporting, attention is mainly paid to the business environment in terms of developing an environment for innovation and entrepreneurship, including small and medium enterprises, to attracting foreign investment, as well as developing transport connectivity and interregional cooperation within the EU.

In Russia, Kazakhstan, and Belarus, the coverage of strategic FEA development directions in regional development strategies is detailed which reflects the great role and FEA development contribution to the implementation of national and regional development priorities, especially in the development of non-resource non-energy exports which is expressed in the adoption of appropriate strategic (program) documents for its development. This is due to the lower level of the economy and FEA development, and at the same time, demonstrates the stage of their active development. These countries' and regions' economies are striving to increase the per capita "saturation" of exports and the saturation of exports with high-tech goods. In some Russian regions, there are separate strategies of development of foreign economic relations, Kazakhstan and Belarusian regions, FEA development pays attention in development strategies for their territories that may explain the spatial specificity and level of differentiation of Russian regions, which requires appropriate strategies for the development of foreign economic activity for the regions in which it plays a special role.

Thus, the contribution of the work performed in theoretical terms is to identify the relationship between the degree of export development of the national economies and

the reflection of promising areas and tools for the development of foreign economic activity in the development strategies of their regions. As a part of the contribution to the applied science development, the analysis allows taking into account the experience of both developed countries, leading exporters, and the EAEU members when developing individual strategies and the regions' program documents in FEA, as well as adapt them to the interests and priorities of cooperation between partner countries in trade and integration interaction.

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Received July 15, 2020.

SPATIAL ASPECTS OF TERRITORIAL DEVELOPMENT

DOI: 10.15838/esc.2020.6.72.4
UDC 338.984, LBC 65.050.22

Integration of Economic Space of the Northern Region: Features and Problems of Ensuring*

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Abstract. Russia's transition to the market in the 1990s which led to the destruction of a unified national economic complex, existing technological, cooperative, social, and other ties between the territories and, as a result, to the disintegration of the country's economic space extremely aggravated the problems of the Northern regions' development. In the context of trade liberalization, when competition began to prevail over cooperation, there was a significant reorientation of economic entities from domestic to foreign markets and their integration into global value chains. In this situation, the production potential and resources of the North were used not only for domestic consumption and accelerated Russian economy development but also for export in the form of low-grade products. This economic pattern leads to significant socio-economic costs, destruction of the domestic market integrity and its space fragmentation. These circumstances make it more urgent to find effective mechanisms for integrating the Northern regions into the national economic space. The purpose of this work is to study the features and problems of ensuring spatial integration of the Northern region's economy. To achieve this purpose, a critical analysis of theoretical and methodological approaches to the interpretation of the essence and factors of ensuring spatial economy integration has been carried out. The key features of transformation and integration processes in the Russian North (RN) in the post-Soviet period have been revealed. The author shows that the cooperation relations of the RN with other regions of the country which have been preserved since the Soviet time are an objective basis for the integration processes development.

* The article is prepared with the financial assistance of the grant of the President of the Russian Federation no. MK-2099.2020.6 "Mechanisms for managing the spatial economy integration of the Russian North regions in the context of implementing the Spatial Development Strategy of the Russian Federation until 2025".

For citation: Kozhevnikov S.A. Integration of economic space of the Northern region: features and problems of ensuring. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 68–83. DOI: 10.15838/esc.2020.6.72.4

However, their progress is hindered by negative demographic processes that limit the integration development in the region's labor market; a decrease in the space transport connectivity level due to the significant destruction of the system of intraregional aviation and inland water transport. The paper identifies transport connectivity of the main economic centers of the RN and "bottlenecks" in the region's transport infrastructure development. The authors substantiate conceptual basis for ensuring spatial integration of the Northern region's economy.

Key words: economic space, spatial integration, Northern region, transport infrastructure, Russian North.

Introduction

The growth of the disintegration processes, the USSR collapse, and the economy transition to market conditions in the 1990s led to the destruction of the common economic space and national economic complex, the weakening of existing cooperative, technological, social, and other ties between the regions. According to L.B. Vardomskii, the economy collapse and other socio-economic problems aggravation were largely due to the economy disintegration which coincided with the "shock" nature of the ongoing reforms. Thus, in most of the USSR republics in 1989, the share of inter-republican exchange accounted for more than 90% of exports, and imports – for more than 70% of a total product volume (including exports and imports)[1]. However, the Soviet collapse led to a sharp destruction of relations between the republics, and the disintegration processes became relevant for the Russia's regions. In particular, only in 1990–1994, the share of interregional turnover in the country's GDP decreased from 25 to 16% [1].

At this stage, the regional competition relations began to significantly prevail over their cooperation which led to destructive processes (increase of the territories' differentiation by their development level, compression and disintegration of the economic space) [2].

In this regard, the position [3–10] on the need to focus on cooperation, coordination, and integration of regional efforts in their socio-economic development is becoming increasingly developed in economic science and practice. It should also be noted that the competition itself is undergoing evolutionary changes, taking qualitatively new forms, where the role the competition and cooperation increases [11].

Space integration creates conditions for the accelerated growth of the country's economy through the effective exploitation of the economic "core" of the regional socio-economic systems and development based on this, using the advantages of specialization and cooperation of long value chains. Ultimately, this leads to an increase in the efficiency of the use of natural resources, labor resources, production, and technical base and regions' infrastructure.

This task is particularly relevant for the Russia's Northern regions, as the Far North zone and its equivalent localities cover nearly 65% of the country's area, and more than 60% of its territory lies to the North of the 60th parallel [12]. The Northern regions have a huge natural resource, transit, and geostrategic potential. At the same time, the economic activity liberalization in the early 1990s led to the fact that these resources were used not so much for domestic consumption and the country's economy development, but in the

[1] Source: *Socio-economic Development of the Post-Soviet Countries: Results of the Twentieth Anniversary.* Moscow: IE RAS, 2012. P. 400.

form of low processing products that were sent for export. So, if in 1995 mineral products accounted for 42% of the export structure, in 2018 they accounted for 65%. This was achieved due to the accelerated growth in exports of crude oil (from 144.4 to 261 million tons in 2000–2018), petroleum products (from 62.7 to 150 million tons), and natural gas (from 194 to 221 billion cubic meters)[2]. According to the researchers' opinion, the production curtailment of high-value products and the exports growth of raw materials lead to the significant costs for the country's economy [13; 14].

It is also appropriate to introduce V.A. Kryukov's opinion which will be true not only for the Eastern territories with special economic regimes (ASEZ, SEZ), but also for the Northern regions for which the task of integrating into the Russia's economic space is acute: "An enclave economy does not produce the desired results if it is completely "self-oriented"... out of connection with the surrounding region and the country as a whole" [15].

This actualizes the task of developing effective mechanisms for integrating the Northern regions' space along the "North-South" line.

The purpose of the work is to study the features and problems of ensuring spatial integration of the Northern region's economy.

Achieving this purpose requires solving the *following tasks*:

– critical analysis of theoretical and methodological approaches to the interpretation of the nature and factors of ensuring the integration of the region's economic space;

– analysis of key features of transformation and integration processes in the economic space of the European North of Russia in the post-Soviet period;

– substantiation of the conceptual framework for ensuring spatial integration of the Northern region's economy.

Theoretical aspects of the research

To understand the essence of the spatial integration, we should first determine what is meant by the category "integration". So, according to the philosophical encyclopedia, it is understood as a development associated with the integration of previously heterogeneous parts and elements into a whole. At the same time, these processes can take place both within the framework of an existing system and lead to an increase in its integrity and organization; or when forming a new system from previously unrelated elements[3].

In P.Ya. Baklanov's work, integration understands as "uniting and establishing stable ties and dependencies in the socio-economic, political and geopolitical spheres at the regional, interregional and interstate levels" [8]. At the same time, the scientist noted that there are no pure inter-industry and inter-district relations; as such relations are formed between economic entities of various industries that are geographically located in different regions. These are the links that are integrated in the form of inter-sectoral and inter-territorial ones.

In turn, L.I. Abalkin interpreted integration as "the economic entities' unification deepening of their interaction, the relations development between them" [7]. G.S. Vechkanov considers integration as a connectivity *state* of differentiated parts into a whole, as well as a *process* leading to such a state [16]. Such processes are based on the economic interests of economic entities at the country's and region's level (integration as the final stage of social organization of the economy-concentration,

[2] Source: Rosstat data.

[3] *Philosophical Encyclopedia*. Moscow: Soviet encyclopedia. Main editorial board: L.F. Ilyichev, P.N. Fedoseev, S.M. Kovalev, V.G. Panov, 1983.

specialization, combination and cooperation). Only then does this process end with the administrative integration at the regional and municipal levels. In fact, V.N. Lazhentsev holds the same position [14; 17].

The authors of the Institute for Economic Research of RAS Far Eastern Branch under the leadership of P.A. Minakir understand the economic space integration as the "integration of economic systems of its selected regions which acts as the basis for the emergence of general system with a new quality". At the same time, integration and disintegration (fragmentation) are opposite processes, but they are closely related to each other [9]. E.M. Buchwald notes that spatial integration can be considered in two aspects: as a natural result of market mechanisms and as an object of state's purposeful policy [18].

Taking into account the critical analysis of the existing interpretations in this article, the author understands spatial integration of the regional economy as a controlled process of strengthening the connectivity of segments of the regional economic and institutional space as a result of the scale and contacts' intensity growth between its elements [19–22].

Based on the theory and practice, the key common factors for ensuring regions' spatial integration include:

1) their territorial proximity (B. Balassa, J. Weiner, J. Tinbergen);

2) formation and development of industrial relations within the framework of the social labor division (cluster theory and TPC);

3) territories' resource complementarity; however, according to the opinion of D.P. Frolov and R.S. Mirzoev [23], the resources similarity can encourage competition to replace the regions' cooperative interaction;

4) common infrastructure (transport, energy, financial, information, etc.);

5) problems similarity in the territories' development;

6) high capacity of the regions' internal markets which encourages the production and trade relations development;

7) presence of traditional historical ties, the need for joint search for solutions to common problems (for example, for the Far North territories), etc.

However, it should be noted that the presented list is not exhaustive, and other specific factors may also play a significant role for different types of the regions (for example, border regions, Northern regions, etc.), as well as spatial economic systems at different levels (supranational, national, regional, local).

Main research results

Across the entire zone of the country's North[4], an important place is occupied by the territories of the *Russian North* [5] (RN: Arkhangelsk, Vologda, Murmansk oblasts, Komi Republic, Karelia, and Nenets Autonomous Okrug). This region's importance in the country's spatial development is caused by the fact that, according to the Russia's Spatial Development Strategy up to 2025, RN is a *geostrategic territory* (a significant part of it relates to the Arctic zone of the Russian Federation); a buffer zone through which the cooperation with

[4] The Northern regions of Russia, in accordance with the current legislation, include 13 entities, territories of which are fully refer to the Far North and localities equated to them (Republic of Karelia, Komi Republic, Arkhangelsk Oblast, Murmansk Oblast, Nenets AO, Khanty-Mansi AO, Yamalo-Nenets AO, Chukotka AO, Republic of Yakutia, Republic of Tuva, Kamchatka Krai, Magadan Oblast, Sakhalin Oblast), as well as 11 entities of which partly belong to the Far North and localities equated to them (Republic of Altai, Amur Oblast, Republic of Buryatia, Zabaykalsky Krai, Irkutsk Oblast, Krasnoyarsk Krai, Perm Krai, Primorsky Krai, Tomsk Oblast, Tyumen Oblast, Khabarovsk Krai).

[5] Researchers usually include the Vologda Oblast as a part of the Northern territories of the European part of Russia (historically, it belonged to the North within the framework of the USSR economic zoning system, for example, it was a part of the Northern territory (1929–1936), the Northern economic region (1982–present)).

the European countries is conducted; this is the beginning of the Northern sea route as one of the main international maritime arteries.

The European North can be considered a region in the full sense of this word. As P.A. Minakir mentions, there are three key conditions for the regions' allocation within the economic space: 1) high economic relations closeness within the region; 2) openness, i.e. its integration into the system of external markets for the region; 3) the performance of certain functions and the presence of clearly distinguished specialization in the national economy. At the same time, the latter, according to the classics of the Soviet economic school (S.V. Bernstein-Kogan [26], I.G. Aleksandrov [27] and others), is the key in zoning.

Speaking about the economic specialization of the Russian North in the national labor division in the USSR period and now, it should be mentioned that the region continues to act as a "resource store", "currency shop" of the country based on the dominant sector of extraction of mineral and forest products that comprise the region's economic core. The localization coefficients, calculated earlier [28] for the main economic activity types, confirm that the leading specialization branches in the region within the national economy are the forest industry complex, ferrous and non-ferrous metallurgy, chemical industry, fuel and energy complex, and transport.

The post-Soviet period influenced on the RN spatial development which was manifested primarily in the *depopulation and compression of the developed space* (the population's concentration and economic activity in the "nodal" points and the increase in the area of the economic periphery). In particular, in the Komi Republic, the share of Usinsk as an industrial center increased from 12.7 to 37% of the total Republic's production, and, in 14 municipalities out of 20, this indicator decreased. Syktyvkar's role in the total population has increased from 19.8% to 30.6%, while the number of remote municipalities is decreasing. As T.E. Dmitrieva notes, the total reduction of the Komi population, on the one hand, led to a decrease in physical population's density and, on the other hand, to the growth of social density[6]. As a result, the resettlement contrast (the ratio of social and physical density) has significantly increased: from 22 times in 1989, 36 times in 2002 up to 52 times[7].

In general, the permanent RN population decreased by almost 1.6 million people in the post-Soviet period. The highest depopulation rates were typical for the Murmansk Oblast (in 1990–2018 from 1190.1 to 750 thousand people, or 37%), the Komi Republic (33%), and the Arkhangelsk Oblast (27%). One of the key reasons is a significant *migration outflow* (*Tab. 1*).

At the same time, population mainly migrates to the Northwestern Federal District and Central Federal District. In particular, in 2018, residents of the Murmansk Oblast mostly left for other entities of the Northwestern Federal District (24,846 people, 62.3%): Saint Petersburg (5,871 people, 14.7%), Leningrad Oblast (2,649 people, 6.6%); Republic of Karelia (1,206 people, 3%); Central Federal district entities (7,827 people (20%): Moscow Oblast (1,485 people, or 4%) Moscow (1,072 people, 2.7%).

In 2018, most of the population moved from the Komi Republic to Saint Petersburg (2,576 people, 11.4%), Moscow and the Moscow Oblast (2,614 people, 11.5%), the Kirov Oblast

[6] Social density is the arithmetic mean of the densities of inhabited territories, weighted by population.

[7] Dmitrieva T.E. Spatial development of the Northern region. In collection: *Actual Problems, Directions, and Mechanisms of the North Productive Forces Development – 2014.* Materials of the Fourth all-Russian scientific seminar: in 2 parts. Institute of Socio-Economic and Energy Problems of the North, Komi RC UB RAS, 2014. Pp. 79–89.

Table 1. Coefficients of the population's migration growth (outflow), people per 10 thsd. people

Territory	Year								2018 to 1990, per mill
	1990	1995	2000	2005	2010	2015	2017	2018	
RF	**19**	**44**	**25**	**20**	**19**	**17**	**14**	**9**	**-10**
NWFD	**-8**	**3**	**-0.2**	**27**	**51**	**16**	**55**	**36**	**44**
Republic of Karelia	*-35*	*-16*	*-13*	*-115*	*-54*	*-12*	*-31*	*-21*	14
Komi Republic	*-134*	*-178*	*-108*	*-163*	*-139*	*-102*	*-112*	*-111*	23
Arkhangelsk oblast (including NAO)	*-78*	*-89*	*-79*	*-72*	*-82*	*-68*	*-69*	*-62*	16
Nenets Autonomous Okrug	*-170*	*-275*	*-62*	*-21*	*-50*	*23*	*-53*	*-89*	81
Vologda Oblast	*-20*	*21*	*1*	*-4*	*-17*	*-17*	*-31*	*-38*	-18
Murmansk Oblast	*-77*	*-254*	*-167*	*-169*	*-69*	*-57*	*-46*	*-59*	18
Kaliningrad Oblast	78	119	60	33	62	82	99	95	17
Leningrad Oblast	62	126	83	146	150	68	171	239	177
Novgorod Oblast	-1	67	10	-1	-21	7	-31	-32	-31
Pskov Oblast	17	87	4	-31	-50	-1	-9	-29	-46
Saint Petersburg	24	37	37	128	157	49	121	52	28
Own calculations based on data of the Federal State Statistics Service.									

(1,791 people, 8%), and Krasnodar Krai (1,632 people, 7.2%). People also migrate from the Republic of Karelia mainly to the Leningrad Oblast (616 out of 9,530 people), Saint Petersburg (521 people), and the Central Federal District (254 people – primarily, to the Moscow Oblast)[8].

One of the key migration factors is the *decline in the role of many compensatory mechanisms*. In particular, if in 2005 the ratio of the average wage to the subsistence rate was higher than the national average in most of the RN entities; nowadays, such ratio is only in the Murmansk Oblast and the NAO (*Tab. 2*).

At the same time, the rate of such outflow may soon become critical, given the fact that most young people and working age people are leaving the RN[9]. In turn, in St. Petersburg, this ratio increased from 3.1 to 5.7 times over the period of 2005–2018.

Table 2. The ratio of the average wage to the subsistence rate (a set of fixed goods), times

Territory	2005	2010	2015	2018	2018 to 2005, +/-
RF	**2.80**	**3.55**	**3.60**	**4.28**	**1.48**
Republic of Karelia	*2.71*	*2.97*	*2.65*	*3.34*	*0.63*
Komi Republic	*3.10*	*3.46*	*3.43*	*4.11*	*1.01*
Arkhangelsk Oblast (including NAO)	*no data*	*2.80*	*2.76*	*3.84*	-
Nenets Autonomous Okrug	*4.41*	*4.17*	*3.81*	*4.28*	*-0.13*
Vologda Oblast	*2.93*	*3.06*	*2.84*	*3.66*	*0.73*
Murmansk Oblast	*2.60*	*3.48*	*3.39*	*4.31*	*1.71*
Kaliningrad Oblast	2.11	3.22	2.93	3.14	1.03
Leningrad Oblast	3.04	3.86	3.90	4.46	1.42
Novgorod Oblast	2.46	3.01	2.86	3.05	0.59
Pskov Oblast	2.32	2.76	2.15	2.76	0.44
Saint Petersburg	3.11	4.71	4.40	5.71	2.6
Own calculations based on the data of the Federal State Statistics Service.					

[8] Data from the territorial authorities of the Federal State Statistics Service.

[9] In particular, in 2018, 7,093 people left the Arkhangelsk Oblast (including the NAO) (4,608 of them are of working age). The largest group is occupied by people aged 15–19 years (1,399 people).

Another negative trend is a *significant deformation of the RN population's age structure* which is much larger than the national average. So, if the average share of the working age people in the country in 1990–2018 decreased by 1.3 p. p. (from 56.7 to 55.4%), in the Murmansk Oblast this decrease was 5.9 p.p. (from 64.5 to 58.6%), in the Komi Republic – 5.2 p.p. (from 61.6 to 56.4%, *Tab.3*).

In fact, the regions where the share of the working age population was initially higher than the national average (the so-called labor-surplus territories) are losing their labor force. If these processes are not stopped, then soon people may face a significant lack of supply in the labor market and other personnel problems that limit the accelerated economic development of these territories.

One of the indicators for assessing the spatial integration of the regional socio-economic system used in the work of the authors' team from the IEI FEB RAS [9] is the indicator *of integration in the labor market*. It is understood as a free flow of labor resources that ensures a balanced labor market in terms of demand for it (from the capital side) and supply. Its uniformity is determined by variations in the level of unemployment and labor market tensions.

The highest unemployment rate of 7.8% in 1993 was observed in the Republic of Karelia, the lowest one of 4.2% – in the Vologda Oblast. At the same time, by 2019, the Vologda Oblast is still the most favorable entity for this indicator, and the most unsatisfactory situation is observed in the NAO – 7.9% and Karelia – 7.4%. Despite the reduction in 1992–2019 of the extremely high heterogeneity level in terms of labor market tension, its current value (48.6%, the threshold coefficient value – 33.3%, *Tab. 4*) still indicates a low level of its integration which is not yet able to be provided by migration flows within the region.

At the same time, our calculations show that migration flows between the RN entities are very equal which may indicate that there are favorable prerequisites for the development of integration processes in their labor market. The closest and most equal relations have developed between the Vologda and Arkhangelsk Oblasts and the Komi Republic (Dvino-Pechora territorial and economic system (TES), as well

Table 3. Population structure of the RN entities by the age groups, % of the total population

Territory	1990			2000			2018			2018 to 1990, p.p.		
	Y	W	O	Y	W	O	Y	W	O	Y	W	O
RF	**24.3**	**56.7**	**19**	**19.4**	**60.2**	**20.4**	**18.7**	**55.4**	**25.9**	**-5.6**	**-1.3**	**6.9**
NWFD	**23.1**	**58.3**	**18.6**	**17.6**	**61.6**	**20.8**	**17.1**	**55.9**	**27**	**-6**	**-2.4**	**8.4**
Republic of Karelia	*25.4*	*57.8*	*16.8*	*19.3*	*61.8*	*18.9*	*18.4*	*53.9*	*27.7*	*-7*	*-3.9*	*10.9*
Komi Republic	*27.7*	*61.6*	*10.7*	*21.1*	*64.9*	*14*	*20.3*	*56.4*	*23.3*	*-7.4*	*-5.2*	*12.6*
Arkhangelsk Oblast	*26.4*	*57.7*	*15.9*	*19.9*	*61.9*	*18.2*	*19*	*54*	*27*	*-7.4*	*-3.7*	*11.1*
NAO	*31.4*	*61.1*	*7.5*	*26.1*	*62.9*	*11*	*24.8*	*56*	*19.2*	*-6.6*	*-5.1*	*11.7*
Vologda Oblast	*24.5*	*54.6*	*20.9*	*19.3*	*59.3*	*21.4*	*19.5*	*53.6*	*26.9*	*-5*	*-1*	*6*
Murmansk Oblast	*26.1*	*64.5*	*9.4*	*18.9*	*67.9*	*13.2*	*18.8*	*58,6*	*22.6*	*-7.3*	*-5.9*	*13.2*
Kaliningrad Oblast	23.1	59.3	17.6	18.4	62.3	19.3	17.8	56.5	25.7	-5.3	-2.8	8.1
Leningrad Oblast	23	56.4	20.6	17.1	60.3	22.6	15.5	56.5	28	-7.5	0.1	7.4
Novgorod Oblast	22.4	54.4	23.2	17.8	57.8	24.4	17.8	52.1	30.1	-4.6	-2.3	6.9
Pskov Oblast	21.2	53.9	24.9	17.3	57.,4	25.3	16.7	53	30.3	-4.5	-0.9	5.4
Saint Petersburg	19.9	59.2	20.9	15.2	61.7	23.1	15.7	57	27.3	-4.2	-2.2	6.4

Note: Y – population younger than working age, W – at working age, O – older than working age.
According to data of the Federal State Statistics Service.

Table 4. Variation in the level of unemployment and labor market tension in the Russian North at the age of 15 years and older

Common indicator	Private indicators	Years	
		1993	2019
Total unemployment rate, %	Min	4.2	4.5
	Max	7.8	7.9
	Max - Min	+3.6	+3.4
	Max/Min	1.86	1.76
	Variation coefficient, %	23.8	19.6
Labor market tensions*, people	Min	3.2	2.0
	Max	24.5	6.4
	Max - Min	21.3	4.4
	Max/Min	7.65	3.2
	Variation coefficient, %	91.6	48.69

* 1992.
According to Rosstat data.

as between Karelia and the Murmansk Oblast (Karelo-Kola TES). Their activation requires the formation of several new economic growth poles within the region.

The degradation of the grassroots settlement network against the background of further migration to cities, the destruction of existing socio-economic, cultural, and other links between urban and rural areas carries a significant risk to the retention and preservation of the Northern space development. So, in 2010, on average in Russia, the share of rural localities with a population of less than 10 people in its total number was 27%, while in Karelia – 30.4%, in the Arkhangelsk Oblast – 46%, and in the Vologda Oblast – 55%. At the same time, since the 2002 census, this share has increased in all entities (except the NAO).

The presence of prerequisites for the development of integration processes in the region's economic space can be judged by the directions of commodity flows. Thus, the RN entities have quite close relations with each other in terms of the goods exchange. However, this is especially evident in the NWFD (whose borders coincide with the borders of the large economic region "North-West" which had existed before 1982).

In particular, in the structure of the goods, imported to the Republic of Karelia from other regions of the Russian Federation, NWFD accounts for 28% of the total trade flow (2nd place after the CFD accounting for 28.7%); in turn, 45.6% of the product volume, exported from the Republic, also accounts for the NWFO. The main attraction centers for incoming and outgoing goods flows within the district are Saint Petersburg and the Leningrad Oblast (*Tab. 5*).

A similar situation is natural for other RN entities. Thus, in the structure of the product export from the Komi Republic, the 1st place is occupied by the NWFD entities (in general, they account for 53.7% of the total commodity flow: the Vologda Oblast – 31.6%; Arkhangelsk Oblast – 7.3%).

The Murmansk Oblast has close commodity relations with the Vologda Oblast (60.1% of the total volume of domestic export). On the region's territory, more than one quarter of products come from the NWFD territory. In the structure of products, imported to the Vologda Oblast, the Komi and Murmansk Oblast account for approximately 37%.

We should mention that the main categories of products that are exported outside the RN to

Table 5. The main flows of import and export of products on the territory of the Russian North, % of the total volume (except export)

Import		Export
CFD (28.7%)		**NWFD (45.6%)**
Yaroslavl Oblast (16%)		Saint Petersburg (17.7%)
Moscow (5%)		Leningrad Oblast (13.9%)
Moscow Oblast (1.7%)		Arkhangelsk Oblast (5%)
NWFD (28.1%)		Vologda Oblast (3.5%)
Saint Petersburg (9.9%)		**CFD (41%)**
Leningrad Oblast (8%)	**Republic of Karelia**	Moscow Oblast (19.8%)
Vologda Oblast (3.6%)		Moscow (14.8%)
Komi Republic (3.9%)		
PFD (23.2%)		
Republic of Bashkortostan (7%)		
Nizhny Novgorod Oblast (4.7%)		
Samara Oblast (3.9%)		
Perm Krai (3.1%)		
PFD (38.9%)		**CFD (19.5%)**
Nizhny Novgorod Oblast (19.4%)		Moscow Oblast (8.2%)
Republic of Tatarstan (5.6%)		Moscow (5.9%)
Perm Krai (5.3%)		
UFD (19.7%)		**NWFD (53.7%)**
Chelyabinsk Oblast (11.4%)		Vologda Oblast (31.6%)
Sverdlovsk Oblast (6.1%)		Arkhangelsk Oblast (7.3%)
Tyumen Oblast (2%)	**Komi Republic**	Leningrad Oblast (7%)
SFD (14%)		Saint Petersburg (3.9%)
Volgograd Oblast (13.2%)		**UFD (10.1%)**
		Chelyabinsk Oblast (4.1%)
NWFD (15.9%)		Tyumen Oblast (3.9%)
Leningrad Oblast (1.3%)		
Saint Petersburg (11.9%)		YNAO (3.1%)
CFD (27.3%)		**CFD (15.9%)**
Yaroslavl Oblast (11%)		Moscow (7.7%)
Moscow (6.5%)		Moscow Oblast (5.1%)
Bryansk Oblast (2.9%)		**NWFD (68.8%)**
NWFD (26.9%)	**Murmansk Oblast**	Vologda Oblast (60.1%)
Leningrad Oblast (8.1%)		Saint Petersburg (2.5%)
Saint Petersburg (6.4%)		Leningrad Oblast (2.5%)
Komi Republic (4.8%)		
Arkhangelsk Oblast (3.8%)		
CFD (15.9%)		**CFD (51.2%)**
Belgorod Oblast (4.9%)		Moscow Oblast (18.1%)
Yaroslavl Oblast (3.6%)		Moscow (15.3%)
Moscow (1.6%)		Kostroma Oblast (3.1%)
NWFD (42.4%)		**NWFD (14.4%)**
Komi Republic (18.9%)		Saint Petersburg (10.5%)
Murmansk Oblast (18.8%)	**Vologda Oblast**	Arkhangelsk Oblast (1.2%)
Leningrad Oblast (1.9%)		Leningrad Oblast (1.2%)
Saint Petersburg (1.5%)		**PFD (21.8%)**
		Nizhny Novgorod Oblast (5.3%)
		Samara Oblast (4.6%)
		Republic of Tatarstan (3.2%)

End of Table 5

Import		Export
PFD (37.4%)		**CFD (24.8%)**
Samara Oblast (11.7%)		Moscow and Moscow Oblast (12.9%)
Republic of Bashkortostan (10.9%)		Kaluga Oblast (4.2%)
Nizhny Novgorod Oblast (5.9%)		Kursk Oblast (1.6%)
Republic of Tatarstan (3.2%)		**NWFD (19.8%)**
CFD (22.6%)	**Arkhangelsk Oblast**	Leningrad Oblast (6.5%)
Yaroslavl Oblast (10%)		
Moscow and Moscow Oblast (5.5%)		
NWFD (21.7%)		
Vologda Oblast (4.3%)		Saint Petersburg (3.5%)
Saint Petersburg (3.9%)		
Leningrad Oblast (2.6%)		
Tyumen Oblast (7.5%)		
Source: own calculations are based on data of Rosstat on the import and export of products in the entities of the Russian European North, as well as on the reports of state authorities of the entities.		

other regions are the products of mineral resource complex and processing of natural resources: the Republic of Karelia – crushed stone and gravel, commercial wood, paper, etc., the Komi Republic – coal and its processing products, commercial wood, lumber, non-metallic construction materials, etc., the Murmansk Oblast – crushed stone and gravel, fish, canned fish, etc., the Vologda Oblast – rolled ferrous metals, steel pipes, mineral fertilizers, commercial wood, liquid and dry milk, canned fish, meat, sausage products, confectionery, flour, feed, etc.

In turn, food (candy, beer, sausage, etc.), products of higher technological value added (passenger and freight cars, wagons trucks, compressors, bulldozers and cranes, medical equipment, paints, car tires, synthetic tools, household furniture) are imported to the territory of the European North from the more southern entities of the NWFD (Saint-Petersburg, Leningrad Oblast) and other regions of the Russian Federation.

The analysis of commodity flows allows identifying certain technological chains that have developed on the RN territory and the previously existing large economic region of the North-West. It is their maintenance and further development that, in our opinion, is the key factor in the integration of the region's economic space.

However, a significant part of trade flows is reoriented toward external markets, not the internal ones. For example, currently, about 65–70% of Karelia's products are sent to foreign markets; in the Murmansk Oblast – 55%, Komi – 40%. In other words, the region is losing significant resources that could have been used to ensure accelerated growth of its economy and improve the northerners' welfare.

The potential for the development of integration processes in space largely depends on the territory's transport connectivity. One of the key types of transport support for the North during the Soviet era was the aviation including intraregional and local significance. It allowed connecting not only the Northern regions with more Southern territories but also hard-to-reach localities in the region.

At the same time, the market reforms of the 1990s had an extremely negative impact on its development. Thus, in the work, air passenger

Table 6. Features of the aviation transport development in the Russian North in the post-Soviet period

Air cluster	Development characteristics
1. North-West (in 1990, it included the airports of St. Petersburg, Pskov, Petrozavodsk, Vologda with an annual passenger turnover capacity of more than 20 thousand people)	In 1990, its main contacts were the North Caucasus (20.8% of its passenger traffic), the Central (14.5%), the Kola air cluster (12.5%), and the European North (9.4%). Later, they were completely replaced by the Central (63%) and Kaliningrad (about 8%) clusters. On other routes from St. Petersburg to the territory of the European Union, the volume of passenger traffic significantly decreased: in 1990–2006* to Murmansk – by 87%, Arkhangelsk – by 81%.
2. Kola Peninsula (in 1990 – Murmansk, Kirovsk)	In 1990, there were 2 airports, and by 2006 – only Murmansk. Its contacts with airports in the European North have completely disappeared. There was a spatial reorientation of air passenger connections: instead of the main direction in 1990, the North-Western cluster (52% of the flow), the priority direction was Murmansk – Moscow (2/3 of the total passenger traffic). Especially noticeable from the point of view of the connectivity of the REN space is the loss of the previously quite busy Murmansk –Arkhangelsk line.
3. European North (in 1990 – Arkhangelsk, Kotlas, Naryan-Mar, Amderma, Vuktyl , Syktyvkar, Ukhta, Pechora, Usinsk, Inta, Vorkuta)	In 1990, there were 11 airports with passenger connections of more than 20 thousand people/ year. There has traditionally been a developed network of local air lines most of which were shut down in the 1990s. Only for the 1990–2006 period, only 6 out of 23 air links remained. The air contacts of the European North with the Kola air cluster were completely lost. If, in 1990, 44% of all air passengers moved within the cluster and 25% – to Moscow, and then, in 2006, the capital accounted for 61% of the total flow and intra-cluster – for 25%.
* The latest official statistics in Rosstat on the development of civil aviation in Russia are presented only for 2006. According to: Tarkhov S.A. *Changing the connectivity of the Russian space (the case of air passenger traffic)*. Moscow; Smolensk: Oikumena, 2015, p. 154.	

Russia's zoning was carried out and three air clusters were identified that somehow connect the economic centers of the European North [29]. In the post-Soviet period, there were very negative processes in their functioning which consisted primarily in a decrease of passenger traffic (for example, the overall decline in traffic on the Murmansk–St. Petersburg airline was almost 90%), and the closure of a significant part of the RN airports (out of 23 air links with the passenger traffic of more than 20 thousand people per year, there are only 6 people left on the territory of the RN cluster, *Tab. 6*), increasing hypercentrism in the functioning of the aviation network (the role of Moscow and St. Petersburg as receiving points of the passenger traffic has increased), a significant weakening, and often complete elimination of a number of intra-regional and interregional air routes.

Similar extremely negative processes are observed in the functioning of inland water transport in the Russian North, where, in the early 1990s, there was actually a collapse in the volume of traffic which has not been overcome to date[10].

For the Russian North, road and rail transport play a significant role in terms of ensuring its space integration. At the same time, there are a number of "bottlenecks" in their development which consist in the limited capacity of highways (primarily in the direction of seaports in the region [30]) and the existing configuration of routes that lead to additional financial, time, and other costs for overcoming the economic space.

[10] For example, if, in 1990, 21.1 million tons of goods were transported into the Arkhangelsk Oblast by inland waterway, then, in 1995, the turnover of goods dropped to 2.7 million tons; The Komi Republic – from 10.3 to 0.7 million tons; Karelia – from 11 to 2.2 million tons. Later, this negative trend only continued. Some revival of cargo turnover has been observed in the past few years, but, in principle, it does not change the existing picture. Source: *Transport in Russia*. Rosstat.

Table 7. Transport connectivity of the main economic centers of the Russian North

City	road*	rail
Vologda	0.79	0.78
Cherepovets	0.77	0.75
Syktyvkar	0.68	0.59
Murmansk	0.67	0.63
Petrozavodsk	0.66	0.58
Arkhangelsk (with Severodvinsk)	0.60	0.67
Average number	*0.70*	*0.67*

Source: own complication.
* - sorted in terms of transport connectivity by road.

To assess the space transport connectivity, we use the tools justified in publications [31; 32; 33]. It allows evaluating transport connectivity in terms of the optimal configuration of routes and population of the main economic centers, connected by these routes[11]:

$$TC_i = \sum_{j=1, j\neq i}^{n} \frac{КР_{ij}}{ФР_{ij}} \times \frac{p_j}{\sum_{k=1,k\neq i}^{n} p_k}, \quad (1)$$

where: TC_i – transport connectivity of the *i-th center;*

KP_{ij} – length of the shortest technically possible route between the *i-th* and *j-th* economic centers;

$ФР_{ij}$ – actual distance between *i-th* and *j-th* centers;

p – population of the economic center;

n – number of the territory's analyzed economic centers;

k – serial number of the economic center (from 1 to n).

The transport connectivity coefficient can take values from 0 to 1. The results of testing this methodological tool are presented in *Table 7*. It should be noted that the largest economic centers of the REN have higher transport connectivity by road (0.70) than by rail (0.67).

Vologda and Cherepovets have the highest road connectivity with other RN centers, while Arkhangelsk and Severodvinsk have the worst connectivity. On the roads, the most "bottlenecks" are the section "Arkhangelsk–Murmansk", "Arkhangelsk–Petrozavodsk". Vologda and Cherepovets also have the highest connectivity with other towns of the RN by rail, while Petrozavodsk has the lowest connectivity. The problem areas are "Petrozavodsk–Arkhangelsk" and "Petrozavodsk–Syktyvkar". As follows from the presented calculations, the problem of increasing transport connectivity of the RN sub-regions (Karelo-Kola and Dvino-Pechora) is one of the key conditions for ensuring the integration of the region's space.

Conclusion and suggestions

It becomes obvious that overcoming the disintegration processes in the Russian economy requires a comprehensive state policy. As V.N. Lazhentsev rightly notes, in relation to the European North, such integration is possible and highly expedient within the framework of a large economic region "North-West", where a successful combination of economic and federal district regionalization occurs. A prerequisite for the further revival of such a large spatial economic system should be an increase in the role of St. Petersburg and the St. Petersburg city agglomeration as the organizing center of the district [14]. In this case, the RN will be part of a large district that has its own specialization within the division of labor system.

[11] In this paper, when analyzing transport connectivity, the economic centers of the region with a population of more than 100 thsd. people were taken.

Considering the NWFD territories as a large economic area, it should be noted that the preserved cooperative relations between the entities are the objective basis for the development of integration processes. In addition, the existing mainline infrastructure (for example, the Northern and Oktyabrskaya railways, systems of inland waterways of the Meridian direction, etc.) also contributes to this.

As the successful global experience shows, one of the basic conditions for the development of the regions' spatial integration is the awareness of their identity[12], the search for joint solutions to the living problems. In our opinion, positioning the entities of the European North (and, in a broader sense, the entire NWFD) as an "Outpost" of the Arctic development is a factor in ensuring the identity of these territories and establishing close cooperative ties between them to solve a common strategic task. In this case, we should expect a decrease in the role of competition factors, an increase in the operational component in the territories' interaction and, ultimately, their spatial integration.

"The framework of the state policy of the Russian Federation in the Arctic for the period up to 2035"[13] justifies strategic issues in terms of the infrastructure (expansion of river navigation, construction of railways, expansion of the airport network, development of information and communication infrastructure, etc.), economic (state support for small and medium businesses, development of mineral resource centers, etc.) development of these territories, as well as international cooperation (strengthening good-neighborly relations with the Arctic States) which, in our opinion, will contribute to the development of integration processes in the economic space of the North and Arctic.

Ensuring the economic space integration of the Northern region requires the transformation of the entire system of strategic management of socio-economic and spatial development. The need to ensure connectivity and form a single economic country's space is enshrined in the main strategic documents at the federal level[14]. However, it is necessary to solve these problems at the district and regional levels. Unfortunately, there is currently no single administrative center which activities are aimed at solving spatial development problems. These powers are distributed among several state authorities (ministries and departments of economic development, transport development, construction, etc.). All of this requires the development of a strategic management system of the region's development, taking into account the spatial integration of its economy. At the initial stage, it is important, in our opinion, to assess the spatial integration level of the economy and identify the main factors and problems (institutional, economic, social, cultural, and other) that limit the development of integration processes.

The analysis of strategies and programs of the RN entities' socio-economic development shows that the spatial development aspect is very limited there, and it is primarily related to the territorial entity's regionalization without analyzing and designing links with the

[12] "Identity" should be understood as the feeling or confidence of belonging to a group or area, or of belonging to that group or area. If this feeling or certainty is related to an area or region, then it refers to spatial or regional identity [34].

[13] "On the fundamentals of the state policy of the Russian Federation for the period up to 2035": Presidential Decree no. 164, dated March 5, 2020.

[14] National Security Strategy of the Russian Federation: Presidential Decree no. 683, dated December 31, 2015; Spatial Development Strategy of the Russian Federation until 2025: Presidential Decree no. 207-p, dated February 13, 2019; Transport Strategy of the Russian Federation in the period up to 2030: Presidential Decree no. 1734-p, dated November, 2008, etc.

economic space of neighboring entities, the district and the country as a whole. In other words, the main forms, methods, and tools for managing spatial integration are not sufficiently integrated and often only formally mentioned; they are declarative or not reflected in these documents at all.

In this regard, an important task at the goal-setting stage is to create guidelines for the development of integration processes in the long run. To do this, we believe that it is necessary to coordinate strategic and program documents for the development of the region and long-term programs for the development of key economic entities as leading economic agents. All of this should form the basis of the regional spatial development strategy.

In turn, the mechanism for implementing the regional development strategy and the spatial development strategy should include tools aimed at integrating space at the intra- and inter-regional levels and coordinating investment plans of economic entities with the goals of territorial development. An important role here is played by the usage of project management technologies in the implementation of PPP and MPP agreements.

At the same time, there is a need to create a mechanism for implementing the development strategy of the Northern region, adapted to the specifics of its economic space. Obviously, the focal nature of productive forces, the sparseness of the Northern region's space leads to the fact that the focus solely on market forces of self-organization and the interests of major economic entities in practice maintain to a mismatch of placing of the regional economy objects and historically developed settlement system; space business and space in the region, and as a consequence of its disintegration. This makes it necessary to increase the direct role of the state as a key agent in the development of the economic space using tools of direct and indirect influence.

The next stages of the research will be devoted to developing methodological tools and assessing the spatial integration level of the Northern region's economy. This will allow assessing the development vector of the integration/disintegration processes in the regional socio-economic system, as well as identifying factors and problems that limit the region's space integration.

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Received September 01, 2020.

DOI: 10.15838/esc.2020.6.72.5
UDC 332.053 + 330.111.42, LBC 65.049(2)

Analyzing Distribution Effects of the Federal Budget Transfers for the Far East

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Abstract. The article analyzes the economic consequences of federal redistributive transfers for the regions of the Far East on the basis of two-regional computable general equilibrium model. The model is based on the assumption that regional government aims at maximizing their total spending which is limited by the size of the region's tax base. Migration, trade and federal transfers are the main sources of regional interconnection in the national economy. The authors calibrated the linearized version of the model on data of nine regions of the Far Eastern Federal District. The regions have significant structural and macroeconomic differences not only in such aggregates as average per capita consumption and wages, but also in terms of average per capita income and budget expenditures. The researchers have found that federal transfers have a negligible effect on the welfare of the regional households. However, they affect other variables, such as consumption, employment, price level, wages, regional taxes and government spending. An initial increase in the welfare level causes an in-migration of labor resources, and a new equilibrium is established at a lower price level and per capita income in the recipient region. Moreover, a decrease in prices for local products is observed for the South Zone of the Far Eastern Federal District (Primorsky and Khabarovsk Krais, the Amur Oblast), while for all other regions there is an opposite effect. The research has shown that the regions of the Far East are characterized by different reactions and may have opposite effects with respect to the state budgetary policy measures in relation to these regions.

Key words: fiscal federalism, Russian Far East, public good, general equilibrium, household's welfare, government spending.

For citation: Isaev A.G. Analyzing distribution effects of the federal budget transfers for the Far East. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 84–100. DOI: 10.15838/esc.2020.6.72.5

Introduction

One of the main characteristics of modern systems of the federal structure, including the Russian Federation, is the state's role as a distributor of financial resources between the regions. This role is manifested especially through the system of federal inter-budget transfers. The main recipients of gratuitous grants are usually the regions that have difficulties with replenishing the revenue part of their own budgets. At the same time, all other things being equal, the amounts of the federal aid depend on the severity of the specified problem in a particular subject. On the other hand, the basis for replenishing the fund of federal resources, intended for redistribution, is the part of the regional tax that does not remain at the regions' disposal. Thus, it does not participate in the formation of revenues of their own budgets.

In economic theory, federal transfers are considered as a part of a fund designed to create expenditure specific to a particular geographical location (region). In this respect, they affect the well-being growth not only of the residents of the territory for which the grants were intended, but also of all other territories, as the latter are also directly involved in the redistribution processes of financial resources of the national economy. Determining the residency, consumers-households can choose the number and types of such benefits provided in certain territories. One of the pioneers of the pure theory of local expenditures, C. Tiebout noted that individuals show their preferences for expenditures through the choice of the "community" – their residency, and there is no way for the consumer to avoid revealing their preferences in the context of spatial economics [1].

Our article is devoted to the analysis of the economic consequences of interregional redistribution of financial resources for the Russia's entities that are a part of the Far Eastern Federal District[1], based on a computable general equilibrium model. The latter is a modification of the model used by the author [2] to study the economic effects of resource redistribution in Khabarovsk Krai, and expands its analytical capabilities by adding a block of interregional trade – an aspect that makes significant adjustments to the households' migration intentions.

The Far East became an object of an active state policy in the 2010s. Designed to ultimately improve the quality of life, business and investment climate, its forms and methods are very diverse. In this regard, it becomes relevant to study the reaction mechanisms of the main economic indicators in the regions of the Far East (welfare, price level, household consumption, etc.) to various aspects of the state economic policy including fiscal policy.

The author was also prompted to continue his work by a recent study of the structure and geographical directions of trade flows in the Far East [3] in which important quantitative results were obtained and systematized.

The model which is the main research tool is an adaptation of the model proposed in [4]. It includes two regions and four economic agents each of which pursues its own economic interests: households, firms, regional governments and federal government. Firms and households demonstrate optimizing behavior: the first maximize profit, the latter – utility (well-being level). The federal government is treated as exogenous, but its actions are subject to budget constraints. Regarding regional governments, there are different assumptions about their target function. It can consist in attracting the population and

[1] It consists of 9 initial constituent entities, except the Republic of Buryatiya and Zabaykalsky Krai.

increasing output, raising the residents' well-being level through expanding the supply of expenditures. The model assumes that regional governments maximize the function of gross public expenditure by setting the tax rate for residents-producers.

Thus, the purpose of experimental simulations is to identify the role of inter-budget transfers in improving the households' welfare in the Far Eastern regions and the national economy as a whole, as well as their impact on changes in key economic variables: commodity prices, employment, consumption, wages, output, and regional governments' expenditures.

In accordance with the above, there we set the following tasks: 1) to present the structure characteristic of expenditure and revenue of the consolidated regional budgets of the Far Eastern regions; 2) to give a formal description of computable general equilibrium models with inter-budget transfers which are the basis for simulation calculations; 3) to prepare and justify the values of the original data corresponding to the model constraints.

The model includes interregional trade: part of the goods produced in one entity is consumed by households in another region. However, if in [4] the share of goods, produced in the region, intended for export is set conditionally and the same for all territories, then in our work the corresponding shares are calculated on the basis of [3] for each federal entity of the Far Eastern Federal District. This is the novelty of the research.

The structure of the article is as follows. First, the author gives a description of the budget federalism and its features in relation to the nine entities of the Russian Federation that are a part of the Far Eastern Federal District. Then, the researcher presents an analytical and graphical representation of the two-regional general equilibrium model with factor and trade interregional flows and the federal government. Then there is a model linearization and value assessment of the initial parameters. Finally, a numerical simulation of nine (for each Russia's entity) variants of the linearized model is carried out by introducing an exogenous shock (federal transfer), and the obtained effects are analyzed in detail.

Budget security of the entities of the Russian Federation constituting the Far Eastern Federal District

Theoretical and economic issues related to the existence of federal grants system include questions related to the optimal size of grants, their impact on the population's well-being not only in a recipient region, but also in all other regions of the national economy.

In world practice, several models of fiscal federalism can be distinguished [5; 6]. Within the framework of the classical model, territorial entities independently conduct their own fiscal policy in an effort to balance budgets. At the same time, the federal center does not face the task of equalizing the tax potential of the entities, and measures of financial support for the regions are mainly of a program-oriented nature. This model assumes a high degree of management decentralization. A striking example of such a policy is the USA.

The cooperative model of the fiscal federalism is focused on the policy of horizontal and vertical alignment of the budget provision of territories, with a level less than a certain threshold value. At the same time, the regions' independence in the field of taxation is lower than in the classical model. This model includes the German economy and, to a large extent, the Russian Federation.

The complete elimination of discrepancies between the revenue and expenditure parts of regional budgets seems unrealistic in Russian

conditions due to significant differences in the economic and resource potential of the regions, the historically established grid of distribution of productive forces. In Russian practice, the list of performed functions and social obligations of the regional governments is covered only in isolated cases by their financial capabilities [7]. All this requires the higher level of government to provide the missing financial resources to the lower levels (for options for optimizing inter-budgetary relations in the Russian Federation, see [8]).

The role of the federal budget funds in providing the population with state benefits has always been significant for the Far East [9, p. 55]. The share of gratuitous receipts in the structure of revenues of the consolidated budgets of nine entities of the far Eastern Federal District[2] ranged from 38% in 2011 to 29.7% in 2018, but it did not fall below 24% during this period. At the same time, the dependence of individual regions on direct federal support varies much more widely. Thus, in the Sakhalin Oblast in 2018, transfers accounted for only 14.5% of its consolidated budget revenues[3], while for Kamchatka Krai, dependence on the federal funds reached 61%, and for the Chukotka Autonomous Okrug – 62.7%.

Based on *table 1*, in the FEFD entities, royalty revenues cover the very different share of total social expenditures in regional consolidated budgets (analysis of balanced budgets, the structure and dynamics of the public debt of constituent entities of FEFD are in [10]). The difference between the penultimate and last columns can be considered as the average per capita volume of expenditures provided by regional governments at the expense of their own income sources. Consequently, given the identity of the average per capita standards of social obligations, the possibilities of regional governments in terms of replenishing the revenue part of territorial budgets are very different.

For the households-residents, the consumption proportions of private and public goods also vary quite significantly from region to region. Thus, in the Primorsky and Khabarovsk krais, the Amur Oblast, the share of gratuitous expenditures in the consumer basket[4] ranges from 12.8 to 16.7%, while in the Chukotka Autonomous Okrug this figure reaches 56.7%.

Table 1. Macroeconomic indicators per capita in 2018, thousand rubles

	Salary	Purchase of goods and service payment	Expenses for housing and public utilities and social and cultural events	Gratuitous receipts in the consolidated budget
Republic of Sakha (Yakutia)	362,0	385,1	175,5	83,7
Kamchatka Krai	407,8	398,5	177,4	170,0
Primorski Krai	267,5	331,5	48,5	16,1
Khabarovsk Krai	313,8	395,8	69,4	20,6
Amur Oblast	250,6	299,2	60,1	17,7
Magadan Oblast	544,4	423,2	218,7	96,1
Sakhalin Oblast	458,2	517,6	243,7	46,3
Jewish AO	194,4	228,8	58,3	25,2
Chukotka AO	770,8	353,7	463,0	454,5

Source: *Russia's Regions. Socio-Economic Indicators. 2019: Stat. Coll.* Rosstat, Moscow, 2019. 1204 p.

[2] Hereinafter, included in the Federal District at the end of 2018, the Republic of Buryatia and Zabaykalsky Krai are not taken into account.

[3] In 2016, even less – 3.5%.

[4] The sum of the costs of goods and services and expenditure on housing and utility sector and socio-cultural events.

We also can note a very different ratio between the size of salary and consumer spending. This aspect reflects both the capacity of consumer markets inside each of the Russia's entities, as well as various opportunities and behaviors regarding savings and spending of monetary income in the current period. We do not analyze the latter aspect in this research[5].

It is obvious that even when adjusted for price levels, the differences between the regions in the levels of per capita income are not a determining factor in stimulating labor migration. Such factors include the size of local markets for goods and services noted earlier, as well as the quality of the living environment, play an important role. The latter aspect is indirectly characterized by the level of per capita public spending in the territory which depends on both the size of the tax base and the degree of federal financial support for the regions. The interdependence and mutual influence of all economic agents creates a complex tangle of interactions between them which makes it difficult to assess the impact of external shocks on the behavior of certain economic variables not only in the region itself, but also in the entire national economy. At an acceptable level of abstraction, general equilibrium models allow estimating the direction and (at least) relative scale of such changes.

Setting up a two-regional model with trade flows

The national economic system consists of households, firms, and regional governments, localized in two regions. In addition, there is a single federal government.

[5] In addition, the issues, set in this research, and the tools do not imply the accounting of the debt aspects of regional budgets (more on the debt obligations of the constituent entities of FEFD, see [11]). On the system of budget restrictions in the Russian Federation at the sub-federal level and on the role of budget loans in financing the deficit of regional budgets, see [12].

There are two types of goods produced – private X and public G. The private ones consist of two goods: the product of region 1 and the product of region 2. Both goods are consumed by households in both regions. The utility function of the representative household in region *i* has the form:

$$U_i = \beta_i X_i^{1-\delta_i}\left(L_i^{1-\theta} G_i\right)_i^{\delta i} = \beta_i C_{1i}^{\gamma_{1i}} C_{2i}^{\gamma_{2i}}\left(L_i^{1-\theta} G_i\right)_i^{\delta i} \quad (1)$$

$$0 < \gamma_{1i};\ \gamma_{2i};\ \delta_i < 1,\ \gamma_{1i} + \gamma_{2i} + \delta_i = 1,\ 0 \le \theta \le 1,$$

where C_1 and C_2 are household consumption of products from region 1 and 2, respectively, G_i is the amount of available expenditures in region *i* on average per household, and L_i is the number of residents in region *i*.

In region *i*, the expenditure provision is ensured in the amount of G_i for all residents-households. At the same time, the volume of public sector services for an individual household is $L_i^{1-\theta} G_i$. The parameter θ is an index of the "individuality" of these services. At $\theta = 0$, expenditures become 100% public when each resident has access to them in full, without reducing the available amount of goods for others. On the contrary, when $\theta = 1$, expenditures are provided purely individually, i.e. they are actually "quasi-public". In other cases, public goods are "partially competitive". The article [13] shows that the $\theta G/L$ value represents the marginal congestion costs, i.e. the price as the form of reduced availability of expenditures to private households, to pay to the resident in connection with the population growth due to migration. It is further assumed that $\theta = 1$.

Each of the L_i households in region *i* offers one unit of labor to the residents-enterprises. As a reward for work, it receives a nominal salary W and a part of the company's profit in the amount of π. We assume that interregional trade is carried out freely and without costs. This means that the product price from region

i is the same for both regions. As the model does not assume savings, all of the household's disposable income M is spent on purchasing goods. Thus, the budget constraint can be written as:

$$M_i = \pi_i + W_i = P_1 C_{1i} + P_2 C_{2i}. \quad (2)$$

Maximization (1) under the budget constraint (2) allows determining the function of individual demand for the benefit of C_j:

$$C_{ji} = \frac{\gamma_{ji}}{1-\delta_i}\frac{M_i}{P_j} \qquad j = 1,2. \quad (3)$$

As each household offers firms one unit of labor, L_i is the labor volume supply in region i. There are N companies in the region, and their number is set exogenously. The production process of each of them is characterized by the same production functions with decreasing marginal productivity of labor. We suppose that there is one firm operating in each region, and then the regional issue of Y_i is defined as:

$$Y_i = {L_i}^{\alpha_i} \qquad 0 < \alpha_i < 1. \quad (4)$$

A representative firm operates under conditions of perfect competition both in the labor and product market. Profit Π_i is the value of:

$$\Pi_i = P_i Y_i - W_i L_i (1 + T_i), \quad (5)$$

where T_i is the tax rate value charged by the regional government. The model assumes that there is a single tax levied on salaries[6] and paid only to the respective regional budgets. There are no federal taxes. This assumption makes it possible to simplify the model by excluding the target function and optimizing the behavior of the national government[7]. After substituting (4) in (5), the profit maximization condition (with respect to L_i) has the form:

$$P_i \alpha_i {L_i}^{\alpha_i - 1} = W_i (1 + T_i). \quad (6)$$

The part of Y_i output is purchased by the regional government and transformed (with no additional cost) into a local expenditure[8] GR_i (per household), and the residents of both regions as a private good. We assume that the marginal rate of product transformation between the private and public good is constant and equal to one, as the ratio of their marginal costs is equal to one at any point of the transformation curve (*Fig. 1*). The governments' expenditures are covered by their tax revenues. The model assumes that regional budgets are balanced:

$$P_i L_i GR_i = T_i W_i L_i$$
$$\text{or} \quad (7)$$
$$P_i GR_i = T_i W_i.$$

The federal government does not formally collect taxes. It redistributes expenditures between regions by withdrawing part of $L_i GR_i$ (in the amount of $L_i GF_i$) from the government of region i and placing it at the disposal of households in region j[9]. In fact, intended for gratuitous transfer to the budget of a region, the funds represent that part of the tax revenues of another region that is sent to the federal budget. As far as the model does not assume any other areas of the federal budget expenditures other than interregional transfers, this model technique does not violate the basic principle of redistribution of national income between regions which is the basis of transfers,

[6] Regional firms, compared to households, are non-mobile economic agents. The introduction of an income tax would not affect the motivation of households to change their location, unlike a payroll tax, and would only complicate the model.

[7] Thus, economic agents pay taxes that are not divided into local and federal in the model.

[8] We assume that expenditures do not have interregional effects.

[9] We should note that this transfer (grant) is not conveyed directly to households in reality. It is intended for the aggregate of households that make up the region 1 and region 2 communities. Therefore, the effectiveness of these transfers depends on how collective, rather than individual, decisions are made. For more details, see [14].

but greatly simplifies the analysis. The federal government is also balancing its budget:

$$L_1 GF_1 = L_2 GF_2. \quad (8)$$

Thus, the total amount of expenditures provided for the households' use in region *i* is:

$$G_i = GR_i + GF_i GR_i \geq 0 \qquad G_i > 0. \quad (9)$$

If region *i* is the transfer recipient, the expenditure amount available to its residents will exceed the production capacity of the Federation's entity itself.

Interregional interactions are characterized not only by commodity flows, but also by migration of labor resources[10]. Balance is established when the well-being level in two regions is equalized:

$$U_1 = U_2. \quad (10)$$

The national labor market has a fixed volume:

$$L_1 + L_2 = L. \quad (11)$$

The balance condition in commodity markets implies the distribution of the regional output between local consumption and export:

$$Y_i = L_1 C_{i1} + L_2 C_{i2} + L_i GR_i. \quad (12)$$

Condition (12), along with condition (2), implies a zero net of trade balances of both regions. Region *i* firms distribute all their profits to the region's residents:

$$\pi_i = \Pi_i / L_i \quad (13)$$

Finally, the behavior of the regional governments determines the size of T_i tax rates. In this model, it is assumed that the regional governments maximize their spending under the constraints set by the regions' production capacity[11]:

$$\max_{T_i} \{L_i GR_i\}.$$

The first-order maximization conditions imply:

$$L_i \frac{\partial GR_i}{\partial T_i} + GR_i \frac{\partial L_i}{\partial T_t} = 0, \quad \frac{\partial GR_i}{\partial T_i} > 0 \qquad \frac{\partial L_i}{\partial T_t} < 0. \quad (14)$$

Equations (1)–(14) constitute a two-regional general equilibrium model. The federal government itself chooses the size of one of the GF_i values (for example, GF_2), while the second is determined automatically from the budget constraint (8). Thus, the model contains 27 equations and the same number of endogenous variables. In addition to the GF_2, among the exogenous variables is L.

Before proceeding to the linearized version of the model, the mechanism of the regional system adaptation as a result of an external "shock" (federal transfer) can be shown graphically for clarity. *Figure 1* shows a model of the households' response in region 1 to the receipt of transfer[12] in the amount of GF_1.

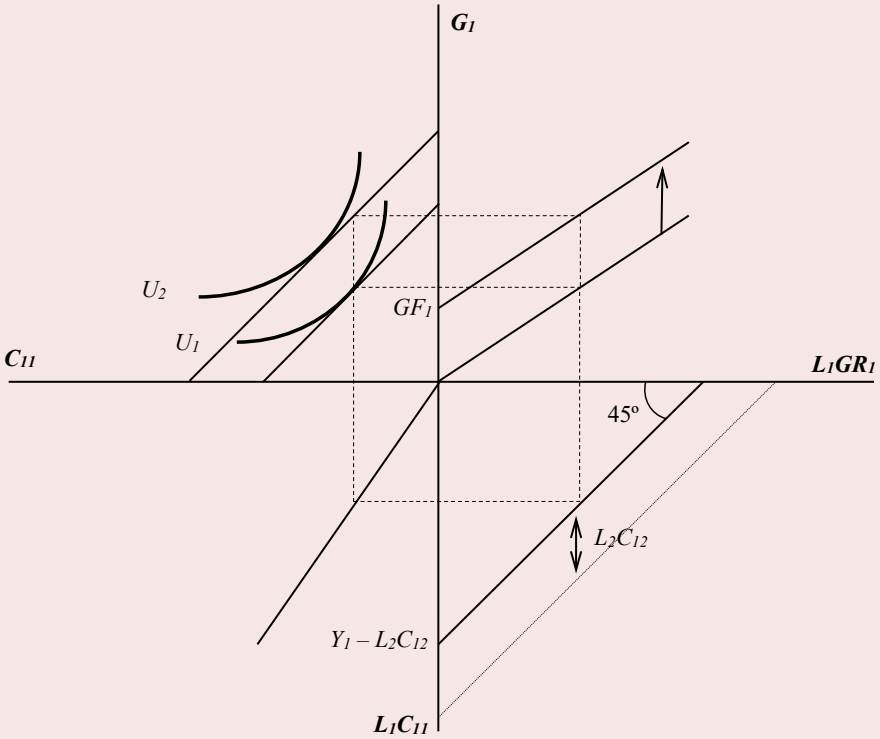
In quadrant 4, there is a residual curve of the region's product transformation. As the marginal rate of substitution in the production of private and public goods is constant and equal to 1, it is a straight line at an angle of 45°. This curve is called residual because it contains many combinations of public and private goods produced for consumption in region 1 which are achievable after the goods volume, intended for export to region 2, has already been subtracted. If the total volume

[10] The model assumes perfect labor mobility between the regions. One of the factors limiting the mobility of labor resources and reflected in theoretical studies (including in the framework of a general equilibrium approach) is the so-called "comfort" of living (in a broad sense) in a particular area (local amenities). However, its reflection in the linearized model is associated with certain difficulties, and this factor is not considered in this research. In more detail, see [15–18].

[11] It can be interpreted as if regional governments maximized the "voter function" in which the satisfaction degree of the median voter depends on total public spending in the region. For more details, see [19].

[12] Graphical version is based on similar principles, but for the case of a two-sector two-product model with private goods, it is presented in [20].

Figure 1. General equilibrium with federal transfer



Source: own calculations.

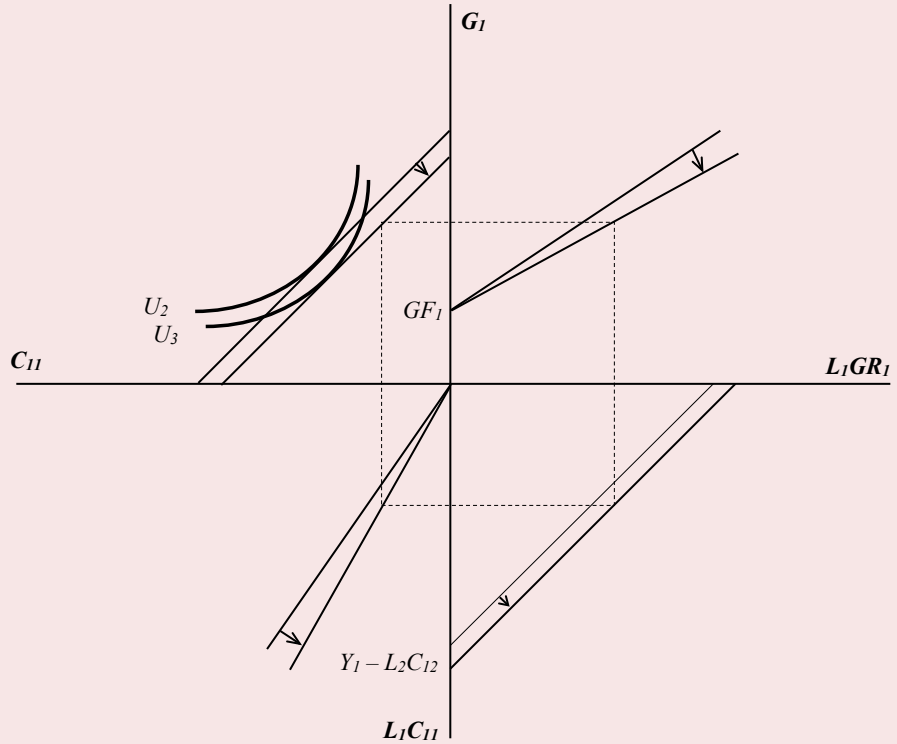
of produced goods remained in region 1 (in the absence of trade), then the maximum volume of produced expenditures (at $L_1GR_1 = 0$) would be Y_1. Given the demand of region 2 is fixed at L_2C_{12} (this value is determined, by virtue of (3), by the households' income in region 2); the maximum output of the private good of region 1 for its households is $Y_1 - L_2C_{12}$.

Quadrant 3 presents the function of transforming the total amount of private good produced for consumption in region 1 into their amount consumed by an individual household. The slope of the straight line here depends on the value $1/L_1$. Similarly, a function in quadrant 1 is interpreted that transforms the total production volume of expenditure into the value of its individual consumption (a ray coming out of the origin). Its slope is also equal to $1/L_1$.

Quadrant 2 shows the projection of the map of indifference and budget constraint on the $C_{11} - G_1$ plane (consumption of local private and public goods). Despite the fact that one of the two goods is free, the budget limit line has a negative slope. Consumption of private goods depends on the amount of household income which, by virtue of (5), decreases as the expenditures production increases. The latter are funded by the regional government, and it is only possible to grow L_1GR_1 by increasing T_1 which causes a reduction in household income.

The federal transfer to region 1 initially causes a parallel upward shift of the function in quadrant 1 by the per capita value of this transfer GF_1, thereby weakening the household budget constraint. The welfare of the latter grows from U_1 to U_2. The drift of labor from region 2 causes further transformations in response to the relative change in welfare levels between the regions (*Fig. 2*).

Figure 2. Migration impact on general equilibrium



Source: own calculations.

The drift of new labor resources in response to the growth in the well-being level in region 1 will primarily expand the region's production capacity as a whole. However, the final position of the residual product transformation curve depends on a number of factors. First, the L_2 reduction will reduce the consumption of private good 1 in region 2. Second, the C_{12} value is affected by income in region 2 and the price level of products in region 1. Their changes caused by the migration process depend on the model parameters. Let us assume that as a result of all the changes, the L_2C_{12} value has decreased. Then there will be a shift of the residual curve of the product transformation from the origin.

As a result of the increase in labor resources, the slopes of the straight lines in quadrants 1 and 3 will correspondingly decrease (and at the same time their length will grow in proportion to the expanded production opportunities). This will lead to a parallel shift of the budget constraint line to the origin[13]. The level of household wealth in region 1 will decrease to U_3. Thus, the equilibrium system is installed in two stages: first, there is the growth of household wealth in the region through provision of additional expenditures (by reducing household welfare in the second region); secondly, migration to the first region from the second (all other things being equal) reduces the level of well-being in the first.

[13] If expenditures are 100% public ($\theta = 0$), the budget constraint line is transformed in a different way. The slope of the beam in quadrant 1 will be 45° regardless of the value of $1/L_1$. Then the entire set of points of the optimum lines of household budget constraints in quadrant 2 for all possible values of L_1 will be an envelope curve (for more details, see Chapter 17 in: Atkinson E., Stiglitz J. Lectures on the Economic Theory of the Public Sector. Transl. from English, edited by L.L. Lyubimov. Moscow: Aspect Press, 1995. 832 p.)

Linearization and calibration of the model

The model represents a system of nonlinear equations (1)–(14) which makes it difficult to solve it analytically in its original form. It is possible to bring the system to a linear form by logarithmic linearization of equations and then analyze the relative (proportional) changes in model variables as a result of changes in exogenous variables. Equations (1`)–(14`) are a linearized version of the model, where lowercase letters denote proportional changes in variables (log differentials), denoted in equations (1)–(14) in capital letters:

$$u_i = \gamma_{1i}c_{1i} + \gamma_{2i}c_{2i} + \delta_i g_i \qquad i = 1,2 \tag{1`}$$

$$m_i = \sigma_{M\pi i}\pi h_i + \sigma_{MWi}w_i\pi h_i = \frac{d\pi_i}{\pi_i} \tag{2`}$$

$$\sigma_{M\pi i} = \pi_i/M_i, \quad \sigma_{MWi} = W_i/M_i$$
$$c_{ji} = m_i - p_j \qquad i,j = 1,2 \tag{3`}$$

$$y_i = \alpha_i l_i \tag{4`}$$

$$\text{п}_i = \sigma_{\Pi Yi}(p_i + y_i) - \sigma_{\Pi Wi}(w_i + l_i + \sigma_{Ti}t_i)$$
$$\sigma_{\Pi Yi} = P_iY_i/\Pi_i, \quad \sigma_{MWi} = [W_iL_i(1+T_i)]/\Pi_i, \tag{5`}$$
$$\sigma_{Ti} = T_i/(1+T_i)$$

$$(\alpha_i - 1)l_i + p_i = w_i + \sigma_{Ti}t_i \tag{6`}$$

$$gr_i = w_i + t_i - p_i \tag{7`}$$

$$l_1 + gf_1 = l_2 + gf_2 \tag{8`}$$

$$g_i = \sigma_{GGRi}gr_i + \sigma_{GGFi}gf_i \tag{9`}$$

$$\sigma_{GGRi} = GR_i/G_i, \quad \sigma_{GGFi} = GF_i/G_i$$
$$\sigma_{l1}l_1 + \sigma_{l2}l_2 = l \tag{10`}$$

$$\sigma_{li} = L_i/(L_1 + L_2)$$
$$u_1 = u_2 \tag{11`}$$

$$y_i = \sigma_{YCi1}(l_1 + c_{i1}) + \sigma_{YCi2}(l_2 + c_{i2}) + \\ + \sigma_{YGRi}(l_i + gr_i) \tag{12`}$$

$$\sigma_{YCij} = L_jC_{ij}/Y_i, \quad \sigma_{YGRi} = L_iGR_i/Y_i$$
$$l_i + \pi h_i = \text{п}_i \tag{13`}$$

$$l_i = gr_i \tag{14`}$$

Equations (1`)–(14`) form a linear system with 27 endogenous variables c_{ij}, u_i, m_i, πh_i, п_i, y_i, l_i, p_i, w_i, t_i, gr_i, g_i, gf_1 and two exogenous variables gf_2 and l. The values of the parameters σ follow directly from their definitions and do not need additional explanations.

The next stage of the research is the model transformation into a numerical form by evaluating the parameters and coefficients of the above model. We have built nine numerical versions of the model, according to the number of federal subjects that were a part of the Far Eastern Federal District until the Republic of Buryatia and the Zabaykalsky Krai were admitted to it at the end of 2018. In each of the model variants, the corresponding region of the Far Eastern Federal District acts as region 1, and the rest of the Russian economy (the national economy minus the corresponding subject of the Federation) acts as region 2.

The linearized model version contains a certain number of parameters that should be evaluated. Some of them are contained in the utility function (1`) and the production function (4`). The rest (σ) are the parameters of linearization. We should pay attention to an important note – the model does not contain a block of savings and investments, as it is inherently static. Meanwhile, real statistical aggregates, on the basis of which parameters should be calculated (consumption volumes, wages and profits, the size of the regional output), also contain "intertemporal" components. Failure to take this part into account will inevitably lead to parameter estimates that are inadequate to the constraints imposed by the model itself. In particular, the total amount of wages and profits (in annual terms) may exceed the annual consumption of households which violates condition (2) of the model. Due to such limitations, the values

of a number of economic aggregates used to estimate the model parameters (1`)–(14`), they do not correspond to their counterparts reflected in official statistics.

For the purposes of the research, we add the value of annual regional output Y_i from the sum of regional household consumption L_iC_i and expenditures of regional budgets L_iGR_i on housing and utility sector and socio-cultural activities, minus the amount of gratuitous receipts to regional budgets.

Further, we have made a strong assumption that the profit of π_i (determined from the structure of household income) goes entirely to the current consumption[14]. Knowing the values of Y_i, GR_i, L_i (the number of people employed in the economy of the region), and Π_i, from the system of equations (5) and (7), it is possible to obtain estimates of the values of W_i[15] and T_i. From conditions (6) and (12), an estimate of the parameter of the regional production function follows:

$$\gamma_{ji} = \frac{C_{ji}}{C_{1i}+C_{2i}+G_i}, \qquad \delta_i = \frac{G_i}{C_{1i}+C_{2i}+G_i}.$$

To estimate the parameters of utility functions (1), it is necessary to consider the values of trade flows between regions that are adequate to the limitations of the model representing a closed national economy. Thus, export and import product flows are not taken into account[16]. Instead, produced within the national economy, goods and services influence on the household wealth. The total export volume from region *i* should be equal to the import volume from region *j*, as we assume that the regional trade is balanced. Instead of arbitrarily setting a fixed share of the value of the private good produced in the region L_iC_i, intended for intraregional consumption, and applying it to all regions, as some authors have done it [4], we will use statistical data[17]. As a variable that characterizes the product share of region j imported to region *i* (d_{ji}), the ratio of the volume of product imports to region *i* from all other regions of the Russian Federation to the value of L_iC_i is taken. Then:

$$L_1C_{11} = (1-d_{21})L_1C_1,$$
$$L_1C_{21} = d_{21}L_1C_1 = L_2C_{12},$$
$$L_2C_{22} = L_2C_2 - L_2C_{12}.$$

Having estimated the values of C_{ij} in this way, it is easy to obtain estimates of the parameters of the utility function. Based on the properties (1):

$$\gamma_{ji} = \frac{C_{ji}}{C_{1i}+C_{2i}+G_i}, \qquad \delta_i = \frac{G_i}{C_{1i}+C_{2i}+G_i}.$$

Finally, the amount of gratuitous receipts to the budget of region *i* represents the size of the federal grant to region *1* (L_1GF_1). In this case, the condition $L_2GF_2 = -L_1GF_1$ must be fulfilled to meet the model constraints.

Thus, based on statistical data, we receive estimates of the variables L_i, L_iC_i, L_iGF_i, Π_i, L_iC_{ji}, taken as the arithmetic mean of the values for 2015–2016[18]. Then we calculate the values of Y_i, W_i, T_i based on the model limitations. The price indices P_1 and P_2 in the base year take the value 1. The resulting aggregates are summarized in *table 2*.

[14] The necessity of this assumption arises from the difficulty of estimating the part of the profit that goes to the purpose of saving.

[15] The value of W_i estimated in this way roughly characterizes the part of the real salary volume that goes entirely to current consumption (assuming that the budgets of regional governments are balanced).

[16] Drawing an analogy with the real world, the model assumes that foreign goods are equally available in each region at the same prices, and their consumption does not affect the amount of household wealth. Thus, access to foreign goods is not a stimulating motive for migration.

[17] Data on the import (purchase) and export (sale) of goods (services) for 2014 for the entities of the Far Eastern Federal District. For a detailed list of information sources, see [3, p. 91].

[18] The choice of the period is mainly due to the comparability of the initial data with data on interregional trade flows of the Far Eastern Regions [3].

Table 2. Source data for calculating model parameters

	L_iC_i (bil. rub.)	L_iGR_i (bil. rub.)	L_iGF_i (bil. rub.)	L_iW_i (bil. rub.)	$Пi$ (bil.rub.)	$1 - d_{21}$	L_i (thousand people)
Republic of Sakha (Yakutia)	153.3	83.1	64.9	120.2	33.1	0.86	483.1
Region 2	19733.6	5,129	-64.9	17684.0	2049.6		71,762
Kamchatka Krai	48.4	3.8	41.6	44.6	3.8	0.60	168.2
Region 2	19838.6	5208.3	-41.6	17759.6	2079.0		72,077
Primorsky Krai	266.0	57.0	21.1	233.3	32.8	0.33	975.8
Region 2	19620.9	5155.1	-21.1	17570.9	2050.1		71,269
Khabarovsk Krai	229.3	58.4	16.7	201.2	28.2	0.72	688.5
Region 2	19657.6	5153.7	-16.7	17603.0	2054.6		71,557
Amur Oblast	99.7	26.4	12.5	86.6	13.2	0.46	394.4
Region 2	19787.2	5185.7	-12.5	17717.6	2069.6		71,851
Magadan Oblast	33.7	14.7	9.1	30.9	2.8	0.91	93.6
Region 2	19853.2	5197.4	-9.1	17773.2	2080.0		72,152
Sakhalin Oblast	117.0	94.6	5.3	99.2	17.9	0.89	286.1
Region 2	19769.9	5117.5	-5.3	17705.0	2064.9		71,959
Jewish AO	13.3	3.9	4.8	10.7	2.7	0.70**	70.0
Region 2	19873.6	5208.2	-4.8	17793.5	2080.1		72,175
Chukotka AO	8.1	2.5	14.3	7.9	0.3	0.88	32.5
Region 2	19878.8	5209.6	-14.3	17796.3	2082.5		72,213

* Hereinafter, Region 2 means the national economy except the corresponding entity of the Federation.
** Due to the lack of statistical data, the share of goods and services produced for intraregional consumption is assumed to be 0.7.
Source: *Russia's Regions. Socio-Economic Indicators. 2016*: *Stat. Coll*. Rosstat, Moscow, 2016. 1326 p.; *Russia's Regions. Socio-Economic Indicators. 2017*: *Stat. Coll*. Rosstat, Moscow, 2017. 1402 p.

Data in table 2 are the basis for estimating the linearization parameters σ, the utility function, and the production function.

Simulation calculations based on numerical model versions and interpretation of the results

In each simulation, one of the nine federal entities becomes region 1, while the rest of the Russian economy becomes region 2. The exogenous effect is an increase in federal transfers to region 1 due to the reallocation of government spending from region 2. Thus, by changing the gf_2 value, the effect of transfers on all endogenous variables of the model can be traced. The magnitude of the exogenous impact should not lead to significant transformations of endogenous variables, as the linearized model version assumes only marginal changes in the values. At the same time, these changes should be sufficient to have measurable results.

In our opinion, such gf_2 will be optimal which will provide an increase in ΔGF_1 by an amount equal to 20% of the average per capita gratuitous transfers, as at lower values changes in a number of key model variables may be close to zero:

$$\Delta GF_i = 0.2\frac{\sum_i^n L_i GF_i}{L}.$$

The average value of per capita gratuitous transfers for 2015–2016 is 22,960 rubles (respectively, ΔGF_i = 4,592 rubles.). As far as all the entities of the Far Eastern Federal District were grantees during the specified period, the percentage changes of gf_2 have a positive sign in each simulation, but differ in absolute value. We assume that the federal governments direct transfers in order to improve the residents' welfare of region 1 (from reducing welfare in the rest of the country).

The results of nine simulations, carried out on the basis of a linearized computable general equilibrium model[19], are presented in *table 3*.

[19] Estimates are obtained using the "Solution Search" function of the MSExcel package.

Table 3. Simulation results

	RS(Ya)	KK	PK	KhK	AO	MO	SO	JAO	ChAO
m_1	-0.673	1.624	-1.426	-2.176	-1.420	-0,745	-4.644	-1,082	-0,072
m_2	1.500	2.879	1.194	1.576	1.704	2,479	0.946	2,299	0,909
p_1	0.964	1.821	-0.553	-0.774	-0.186	0,931	0.706	0,581	0,259
p_2	1.495	2.878	1.181	1.563	1.698	2,477	0.938	2.298	0.909
t_1	4.162	1.457	3.542	5.264	4.480	5,030	11.798	5.325	1.322
t_2	-0.020	-0.004	-0.050	-0.050	-0.024	-0,006	-0.031	-0.005	-0.001
w_1	-1.041	1.615	-1.511	-2.321	-1.559	-0,880	-5.524	-1.367	-0.082
w_2	1.500	2.879	1.196	1.578	1.705	2,479	0.947	2.299	0.909
y_1	1.855	1.160	2.322	3.353	2.783	3,033	5.098	2.853	0.956
y_2	-0.013	-0.003	-0.032	-0.033	-0.016	-0,004	-0.020	-0.003	0
y	0.004	0	-0.002	0.006	-0.002	0,002	0.023	-0.001	0
c_{11}	-1.636	-0.197	-0.872	-1.402	-1.234	-1,676	-5.350	-1.662	-0.331
c_{21}	-2.167	-1.254	-2.607	-3.739	-3.118	-3,222	-5.583	-3.379	-0.981
c_{12}	0.536	1.058	1.747	2.350	1.890	1,548	0.240	1.718	0.650
c_{22}	0.005	0.001	0.013	0.013	0.006	0,002	0.008	0.001	0.000
gr_1, l_1	2.158	1.252	2.584	3.716	3.107	3,219	5.568	3.377	0.981
gr_2, l_2	-0.015	-0.003	-0.035	-0.036	-0.017	-0,004	-0.022	-0.003	0
u_1, u_2	-0.007	-0.002	-0.003	-0.004	-0.002	-0,001	-0.003	-0.001	-0.001
нач. u_1	0.268	0.267	1.142	0.833	1.025	0,237	0.469	0.720	0.036
gf_1	1.244	0.602	18.654	15.216	11.410	1,502	19.252	3.298	0.062
gf_2	3.416	1.857	21.273	18.968	14.534	4,726	24.843	6.678	1.043
g_1	1.757	0.656	6.918	6.271	5.766	2.564	6.293	3.333	0.197
g_2	-0.059	-0.018	-0.123	-0.097	-0.052	-0.012	-0.048	-0.009	-0.003

Note: RS (Ya) – Republic of Sakha (Yakutia), KK – Kamchatka Krai, PK – Primorsky Krai, KhK – Khabarovsk Krai, AO – Amur Oblast, MO – Magadan Oblast, SO – Sakhalin Oblast, JAO – Jewish AO, ChAO – Chukotka AO.
Source: own calculations.

From the point of view of the federal policy, the most important result is a decrease in household utility levels in both regions in all nine variants of the numerical simulation. In other words, increasing federal transfers to these regions is a Pareto-suboptimal solution. However, from a formal point of view, these changes are so small that they can generally be ignored. It should be noted that the effectiveness of redistributive measures is particularly low against the background of significant volumes of GF_2 for a number of regions (Primorsky and Khabarovsk krais, Amur and Sakhalin oblasts). Meanwhile, if we consider only the initial change in U_1 as a result of the increase in GF_1 that followed the transfer from region 2 (line *нач.* u_1 in Table 3), then the effect of redistribution on the welfare of the "indigenous" residents of these regions (before the endogenous change in all other variables including changes in the number of residents) at the initial moment will be positive and quantitatively significant. However, the subsequent changes in other endogenous variables ultimately negate the "gain" of well-being.

As for changes in the behavior of regional governments in terms of their fiscal policies, all nine simulations show significant increases in regional taxes T_1 and average per capita spending GR_1. And to a relatively small extent, this is typical for the Chukotka Autonomous Okrug and Kamchatka Krai. This situation is due to the fact that in these entities the role

of the regional governments in providing population with expenditures at the expense of their own sources of income is initially low (see tab. 1). On the other hand, the tax rate and government spending in the donor region were expected to decline in response to the exogenous shock in each of the nine simulations. The Sakhalin Oblast which is characterized by the lowest amount of federal transfers among all the Far Eastern entities of the Federation and the maximum amount of local government expenditures (330.6 thousand rubles per employee), demonstrates a significant increase in the tax rate (11.8%) and the associated increase in local budget expenditures (5.6%).

The result for the Sakhalin Oblast looks paradoxical in light of the fact that the region has the highest basic level of per capita spending GR_1 among regional governments (as a consequence, the highest tax rate T_1).

This can be explained as follows. The target function of the regional governments in the model is to increase public spending within their jurisdictions. On the one hand, an increase in the tax rate leads, by virtue of (6), to an increase in labor costs and a reduction in employment, resulting in an outflow of households from the region. This reduces the total costs of the regional government. On the other hand, by increasing tax rate, the government loosens its budget constraint by raising average per capita spending for a given number of households. At the optimum point, the regional government sets a tax rate that balances the impact of the above two effects on total government spending. Receiving the federal transfer will increase the households' welfare level in the recipient region which will attract additional population to it. To restore the government's average per capita spending to its previous level, the tax rate will be raised.

The immediate effect of the federal transfer will be the increasing consumption of expenditures in the recipient region, leading to a growth in welfare. The resulting difference in wealth levels between regions will trigger migration processes to region 1 which will stop when these levels become equal again. Thus, the growth in the labor force in the recipient region and its reduction in the donor region will be a clear result of the redistribution of financial resources.

The dynamics of the number of labor resources is directly related to the output dynamics. Due to the properties of the production function, the increase in total output in region 1 will be less than the employment gain, while for region 2, the decrease in output is lower than the employment decline (at least in those simulations where the effect is statistically noticeable). As for the output per employee ($y_i - l_i$), the donor regions will be characterized by its reduction as a result of the federal transfer. It is also interesting to follow the changes in the gross output of country y. As table 3 shows, migration has a dual effect on this indicator – in four cases it is positive, in three – negative. In two other cases, the impact on the value of national output is not observed.

Federal transfers also have an impact on price changes. In three recipient regions (Primorsky and Khabarovsk krais, the Amur Oblast) the price level of local production p_1 has decreased. Characteristically, in all simulations, there is an increase in prices for the products of the donor region, and more significant than for the recipient region (for cases where $p_1, p_2 > 0$). Changes in prices are also associated with transformations in interregional trade. It is worth noting rather significant reduction in the average per capita consumption of products of region 2 by the recipient region. On the contrary, residents of the donor region take the average per capita consumption of goods in region 1.

The value $c_{21} + l_1$ characterizes the change in the import of region 1 from region 2. Accordingly, $c_{12} + l_2$ reflects the export dynamics from region 1 to region 2. It follows that, in general, the import volume of goods to the recipient regions practically does not change (formally speaking, $c_{12} + l_2$ is reduced within thousandths of a percent). On the contrary, the products export from the recipient regions to the donor region raises significantly (in some cases – more than 1.5%). As far as interregional trade is balanced in the original model, the difference between these values gives a percentage change in the trade balance. Thus, in all tested cases, federal transfers improved the terms of trade in favor of the recipient regions.

The above effects can justify in the following way. The reduction in output per employee in the recipient region results in a reduction in salaries, profits and, as a consequence, the income of a representative household in region 1. This will lead to a reduction in the specific consumption of both goods. Similar, but with the opposite sign, processes cause an increase in per capita consumption in region 2.Thus, there will be a reduction in demand for product 1 in region 1, but an increase in demand for it in region 2. However, in a number of cases (Primorsky and Khabarovsk krais, the Amur Oblast), the total excess supply of local goods in the national economy will lead to a drop in prices for them.

The model calculations, the results of which are shown in table 3, are carried out under the assumption that regional governments set the tax rate in such a way as to maximize their spending in the region. The question arises whether the results of calculations strongly depend on this premise. A comparison can be made with the results of simulation under the assumption that the behavior of regional governments is set exogenous. In this case, equation (14`) is replaced by the condition gr_i=0. Therefore, T_i is determined based on maintaining the budget constraint of regional governments.

Based on the evaluation results within the framework of this option, it is impossible to say unambiguously that there is a trend in changes in indicators. In the case of the Republic of Sakha (Yakutia), Magadan and Sakhalin Oblasts, the new results were unrealistic (the values of changes in individual variables for both region 1 and region 2 were 20% or more). For the Kamchatka and Primorsky krais, the Amur Oblast, the signs for all variables remained the same as in table 3, but slightly decreased in absolute value. Finally, for the Khabarovsk Krai, the Jewish AO, and the Chukotka AO, the signs for the variables for the recipient region did not change, and for the donor region, most of the variables changed the sign to the opposite. For the last two groups of regions, there is a weak tendency to increase welfare if regional governments behave as agents that maximize their budget spending functions.

Conclusion

The article analyzes the effects of inter-regional transfers for the regions of the Far East carried out by the federal government, using a two-regional computable general equilibrium model with optimizing regional governments. Nine numerical simulations were carried out on the linearized version of the model the parameters of which were calibrated using statistical data for nine federal entities of the Far Eastern Federal District for 2015–2016.

We have found that federal transfers have almost no effect on household welfare, but lead to significant changes in other economic variables. Despite the essential initial increase in the residents' welfare of the Far Eastern regions as a result of the growth in the value of federal transfers, the households' ability to optimize their consumer basket and migrate from region to region in response to the difference in utility

levels ultimately leads to the leveling of the resulting benefits. It is achieved at the cost of significant changes in the levels of prices, wages, output, tax burden, and regional budget expenditures, primarily in the recipient regions. The initial increase in wealth leads to an influx of labor resources, lifting output, but reducing labor productivity and salaries. Regional governments respond to the population's influx by increasing the level of budget expenditures through tax rate growth which puts additional pressure on salaries and incomes of residents, reducing their consumption level. In the end, welfare returns to its original level and a new equilibrium is established at a lower level of prices and average per capita income in the recipient region.

From the point of view of the federal government, the most pronounced effect will be the migration toward the regions receiving federal grants, as a result – the GRP growth of the latter. It should be clarified, however, that all estimates are based on the assumption that the price level in both regions is equal in the initial period ($P_1 = P_2 = 1$) which is not the case in reality[20]. It follows that the decline in cost indicators in the recipient regions should be interpreted only as a slowdown in their growth rates compared to the national average.

As we have already noted, the model is static in nature and considers households as agents aimed at current consumption. Consequently, their motives for future consumption and savings are not taken into account. However, it is widely believed that the main motive for migration to the Far East is the ability to expand the budget restriction of future periods in order to increase future consumption. This is true if we assume that consumption consists only of private goods, whereas, according to the same neoclassical theory, the comfort level and convenience of living provided by the presence of expenditures is an incentive to change the location [16].

An important conclusion that confirms the earlier ones [3] is that the Russian Far East does not represent a homogeneous integral economic system that could be described as the "economy of the Far East". In fact, the Far Eastern Federal District is a set of federal entities characterized by different natural and geographical, demographic, structural and economic conditions that do not determine the overall single common market. In addition, the research allowed supplementing this description of the macroregion with the following feature: the constituent entities of the Far Eastern Federal District are characterized by different reactions and different, sometimes having the opposite direction, effects in relation to the policy measures of resource redistribution.

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[20] This (imaginary) equality implies only that in the initial period the economy is in equilibrium, and interregional price differences are taken into account when forming similar data and calibrating the model. In reality, for example, the cost of living in Kamchatka Krai in 2016 was twice as high as the national average.

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Received October 20, 2020.

MODELING AND FORECAST OF SOCIO-ECONOMIC PROCESSES

DOI: 10.15838/esc.2020.6.72.6
UDC 332.13, LBC 65.05

Experience in Agent-Based Modeling of Interregional Value Chains*

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* The article is prepared with the financial support of the grant of the President of the Russian Federation no. MK-2135.2019.6.

For citation: Experience in agent-based modeling of interregional value chains. E.V. Lukin, T.S. Anosova, A.E. Mel'nikov, M.A. Sidorov. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 101–116. DOI: 10.15838/esc.2020.6.72.6

Abstract. Solving the problem of implementing powerful socio-economic breakthrough in Russia requires the formulation and implementation of the latest practices for the development of the corporate sector, civil society, and state institutions. In theory, these practices should be the product of some innovative activity in the management sphere. However, world experience shows that initiatives correlating with the current development paradigm and are its logical continuation can provide no less effective results. In particular, we are talking about the Russian policy of industrial diversification and import substitution. The country is definitely making progress in these areas, but it is too early to talk about confident results. Meanwhile, a reasonable and, most important solution of the issue, which is not contrary to the interests of the elite, has been in the focus of the scientific community for several years, this is the value chains. Handled properly, they can act as a driver for the development of territories, business, and the social sphere. The purpose of the research is the formulation and testing the tools for value chains modeling. In turn, the novelty of the tools lies in the possibility of taking into account the interregional factor of interaction and the availability of functionality for the implementation of variable calculations of the developing phenomena in the economy. The model peculiarity is provided by the synthesis of methods of intersectoral balance and agent-based modeling which, according to other research teams, provides greater accuracy and realism of modeling. In the course of the study, the authors analyze domestic and foreign experience in designing value chains, and present their characteristics in the regional context. The researchers represent a consequence assessment associated with stimulating consumer demand and the expected effect that can be caused by the value chains value chains development.

Key words: value chains, interregional interaction, agent-based modeling, tables "input – output".

Introduction

Russia has incredible opportunities that are uncompromisingly dispersed in the interregional space in favor of the interests of the export-oriented production elite. Dependence on the natural rent is undoubtedly a serious issue for the Russian economy which significantly constrains the prospects of realizing resource potential. However, given the already great attention to this topic (the notorious oil needle, its weaknesses, related threats, and other nuances of the current economic system), we will ignore it now.

Economic development can and should be carried out in completely different directions, with no need for a sharp change in the current paradigm or deliberate containment of individual sectors, thereby ensuring the diversification processes which the Russian authorities have often focused on in the last decade. Naturally, this will require certain innovations in the legislative and managerial spheres; it is necessary to work out and implement new development tools. It is significant that the scientific community has been changing conceptual results in the relevant areas for many years. In particular, we are talking about the value chains development (hereinafter referred to as VC) which can be considered a new driver of socio-economic evolution.

The relevance of these issues is given by the fact that in the recently approved Integrated Strategy for Industrial Development[1], one of the priorities of industrial policy is the production diversification with access to

[1] Integrated strategy for industrial development up to 2024 and for the period to 2035: Decree of the Russian Government no. 1512-R, dated June 6, 2020. Available at: http://static.government.ru/media/files/Qw77Aau6IOSEIuQqYnvR4tGMCy6rv6Qm.pdf

adjacent stages of production chains. At the same time, the question whether the regional authorities have enough tools to facilitate the activation and subsequent intensification of operations in this direction remains open.

The problem is also complicated by the fact that developed (in other words, large, multifunctional) VC are rather rare practice in the Russian economy. Basically, there is a small dimension including a couple of production stages which influences on the entire state's socio-economic system. In particular, these are low GDP growth rates, investment unattractiveness of certain industries, growing territorial disparities, deindustrialization processes, and insufficient demand for basic science.

The lack of culture of organizing full-cycle production and focusing on the production of final high-tech products, rather than the semi-finished ones, does not allow leveling country's dependence on imports with any confidence. At the same time, in recent years, the global economy has clearly identified a trend toward the implementation of protectionism tools of domestic producers including common usage of sanctions rhetoric. In such conditions, the risks associated with access to imported equipment and components significantly increase for the Russian consumer of technological products.

Accordingly, it is hard to argue with the expert community's opinion about the need to focus on the domestic market evolution and the domestic demand formation. In this regard, the role of value chains is definitely significant: developed VC will allow shifting profit-taking from the stages of raw materials extraction and semi-finished goods production, increase the volume of value-added formation, create prerequisites for growing the state's income, companies, and population. The emergence of questions related to understanding how it is possible to solve these problems and realizing the magnitude of the existing potential actualizes the need to analyze existing and model promising value chains in the Russian economy.

Theoretical aspects of the research

In the scientific literature, the value chain is understood as a full range of activities that are carried out by enterprises to bring a product or service from the development stage to usage by a final consumer [1]. The VC expansion process characterizes the geographical fragmentation of production in accordance with the principles of comparative advantage. The VC concept (or rather global VC) appeared in the 1970s as an attempt to find an answer to the question of why some countries were developing faster than others. For this purpose, the author analyzes the states' participation in the global division of labor and evaluates their involvement in the process of creating value along the entire technological chain – from the moment of product design to its implementation to a final consumer [2].

Value chains are characterized by the complexity and versatility of the relationships between the subjects of economic relations among themselves, so the main problems of the VC development managing are to adequately assess the effectiveness of ongoing processes and correctly determine the degree of compliance of the results with the goals set, as well as to present potentially promising and (or) already formed relationships in an accessible form. One of the options that contribute to solving these issues is the using agent-based models in practice (hereinafter referred to as ABM).

Agent-based modeling greatly simplifies the work in terms of representing the subjects' relationships of economic relations with each other and provides ample opportunities for conducting experiments at various management levels, in order to obtain relevant and most accurate results [3; 4]. This type of modeling

involves determining the parameters of active subjects, agents (they can be people, organizations, regions, individual industries, etc.), describes the features of their behavior and, at the same time, does not have the limitations inherent in traditional modeling methods.

The key ABM advantages are their properties: autonomy (agents perform issues independently), heterogeneity (agents have their own characteristics), limited rationality (agents cannot learn something beyond the macro environment of the model), and location in space (the environment of the modeling agents' placement).

Thus, agent-based modeling allows designing a system that is as close to reality as possible, and to carry out simulations of real phenomena in the economy. Accordingly, such ABM is perfectly suited for designing processes taking place in the interregional space. It is possible to use a large number of interacting agents, as well as to change the parameters and rules of their behavior. In our case, this is a simulation of interregional value chains.

In the scientific community, much attention is paid to ABM as a promising and rather flexible tool for designing socio-economic processes. Researchers, who reflect the nature of interregional interactions, often focus on the spatial aspect. Thus, E.D. Sushko considers an agent-based territorial model where the interaction of households and firms is presented: within the framework of two regions taking into account their localization and possible transport solutions[2]. He proves that various parameters, such as wages, taxes, housing costs, level of production costs, transportation costs, etc., affect the circulation of economic flows, the way products are distributed, and the choice of the region as a place of residence and work.

The spatial aspect, as a continuously changing phenomenon, is taken into account in the work of V.I. Suslov and his colleagues [5]. Traditional interregional models are unable to reflect the complex dynamic nature of economic processes, so it is proposed to use more functional agent-based models as an alternative. According to the authors' opinion, the ABM advantage is the ability to study economic processes taking into account the spatial factor represented in this case by transport costs.

Other studies determine the nature of the space resistance influence, as measured by the level of transport costs, on the connectivity of multi-regional economy. For example, on the basis of the tables "input – output", we reveal the nature of the cost impact on the structure of the region's products use. With transport costs growth, there is an increase in product consumption within the region which makes regional coefficients higher and interregional coefficients lower. Accordingly, interregional cooperation is reduced. On the contrary, with a decrease in transport costs, there is an increase in mutual supplies [6; 7].

A significant advantage of the agent-based multi-regional intersectoral model is the usage of statistical elements (data from tables of "input – output") and geoinformation approaches [8]. From practical point of view, this means that the behavior of agents and their relationships can be described with a greater degree of realism, taking into account a greater number of small nuances. Thus, it is possible to obtain more accurate modeling results.

Appealing to the foreign experience of using ABM, we note in principle a higher penetration level of models of this type in socio-economic research. The issues are very diverse, and

[2] Sushko E.G. Agent-based territorial model. Available at: http://abm.center/info/articles/agent-orientirovannoe-modelirovanie/349874/?sphrase_id=17730

they are considered on different scales. At the same time, in most cases, common ideas are optimization of logistics and other flows, improving the efficiency of current processes and visualizing the possible consequences of decisions made.

For example, one of the models is based on learning agents and reflects the value chain in oil industry [9]. The model is described in the ABM paradigm and consists of interactive and adaptive agents (that accommodate changes and independently determine their behavior). A distinctive feature of the ABM representation is that modeling allows showing the environment in the most reliable way by including elements that more or less correspond to real systems. The practical side of the model is related to assistance in determining the storage location and various aspects of transportation. This is especially true, as the oil production process is continuous and extremely inelastic in relation to demand in nearly all cases.

The approach to modeling agri-food supply chains in the paper [10] is interesting from the scientific and practical point of view. Chains are essentially a complex dynamic environment in it consisting of stakeholders and their relationships, as well as products, cash, and information flows. Intelligent agents can help stakeholders in the supply chain to minimize costs, increase flexibility, and avoid individual points of failure when working around the clock. The main goal of flow chain design is to create added value at each node of the network. The modeling role[3] is in the creation of decentralized networks, communication mechanisms, and coordination methods.

Another promising direction of using ABM, which has become widespread in the works of foreign economists, is the design of joint value creation schemes in various spheres of economic activity. For example, these may be agricultural chains [11]. There, the value creation depends, among other things, on seasonality and such a factor as the perishable type of product. The consumer and the firm are invited to work together, as the key condition for creating value is the existence of two-way direct interaction. The most important component of the process of this type of modeling is the planning stage which determines the main parameters: the level of demand and prices, the variety and number of seeds, the periods of cultivation and harvesting, etc. So, if information about the demand is not available and the price is not set, the modeling process cannot be moved to the next stage.

At the same time, despite the growing research interest in the VC problems, there is still a wide scope for its development. In particular, it is promising to study issues related to modeling the "lengthening" of value chains and stimulating domestic demand in the Russian economy, as well as to assess the regional effects of these processes. We are trying to start moving in this direction.

Research methodology

The methodological tools of our research are based on the author's agent-based model of interregional VC. The model includes four types of agents: firms, households, state and foreign market.

Based on the VC research task, in the model, the firms are divided into six enlarged industries by type and stage of output: mining,

[3] The authors carried out the ABM implementation on the basis of two different software platforms: JADE and NetLogo. During the modeling, the researchers have found that both platforms can be used in the modeling of multi-agent systems. Their peculiarity is that the JADE provides more reliable models using the JAVA programming environment, and it is a more complex platform. NetLogo, in turn, has a simple user interface, and it ensures fast model development.

intermediate and final processing, construction, transport and service production. Extractive firms[4] produce primary resources of the economy (various types of minerals, agricultural and forestry products) which are sent to intermediate processing firms[5]. In turn, they carry out the initial processing of raw materials and supply a wide range of semi-finished products to the final processing firms[6] which later create goods for the final consumption. In the model, construction firms[7] and firms specializing in producing services[8] consume intermediate goods and supply economic agents with their products. The transportation firms[9] carry out goods portage between all types of firms.

On the one hand, households provide firms with labor power, receive wages and social transfers from the state, and make decisions about their income distribution; on the other hand, they form domestic demand acting as consumers of various goods and services and paying taxes to the state.

The state has the functions of collecting taxes and redistributing them (transfers to households), as well as regulating foreign trade.

In relation to agents in the model, the external market is the markets of other regions of Russia and foreign countries. Firms can send their products either to the territory of the three regions used in the model, or to the external market (i.e., to other Russian regions and for export). Similarly, the supply of goods and services for the needs of firms and households can come from the regions represented in the model, other Russian regions and foreign countries.

The structure of agent relationships in the model is in the scheme in *figure 1* (it does not include a number of relationships at this stage of the research for simplicity). We should note that an important feature of the model is taking into account the location of agents in space (all agents have geographical coordinates) which allows characterizing the transport costs for the goods portage.

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[4] In accordance with the RNCTEC, in the model, extractive firms include production of such activities as A. Agriculture, hunting, forestry; B. Fishing, fish farming; C. Mining.

[5] Intermediate processing firms include productions of activities such as DD. Wood working and wood ware production; DF. Production of coke, oil products and nuclear materials; DG. Chemical production (24.1. Basic chemicals production; 24.6. Other chemicals production); DI. Production of other non-metallic mineral products (26.5. Production of cement, lime and gypsum; 26.6+26.7+26.8. Production of non-metallic mineral products, except glass and ceramic); DJ. Metallurgical production and production of finished metal products (27.1. Production of cast-iron, ferroalloys, steel, hot-rolled products and cold-rolled sheet (flat) products); DN. Other productions (37.1. Treatment of metal waste and scrap); E. Production and distribution of electricity, gas and water.

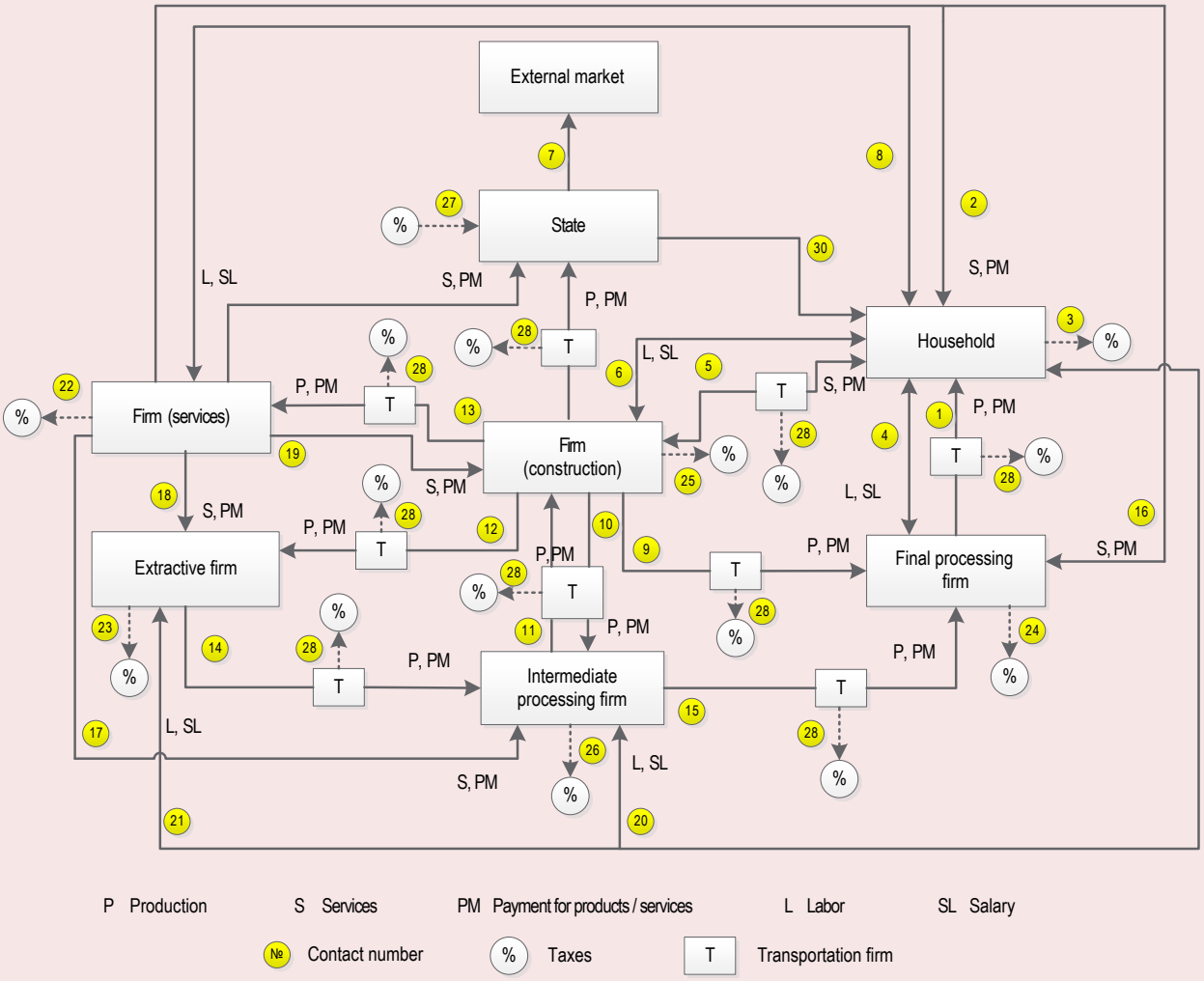
[6] Final processing firms include production of activities such as DA. Food production includes beverages and tobacco; DB. Textile and clothing manufacturing; DC. Production of leather, leather goods and footwear; DE. Cellulose and paper production; publishing and printing activities; DG. Chemical production (24.2. Production of plant protection chemicals (pesticides) and other agrochemical products; 24.3. Production of paints and varnishes; 24.4. Production of pharmaceutical products; 24.5 Production of soaps, detergents, cleaning and polishing agent; perfumes and cosmetics); DH. Production of rubber and plastic products; DI. Production of other non-metallic mineral products (26.1. Production of glass and glass products; 26.2+26.3+26.4. Production of ceramic products and bricks); DJ. Metallurgical production and production of finished metal products (28. Production of finished metal products); DK. Production of machinery and equipment; DL. Production of electrical, electronic and optical equipment; DM. Production of vehicles and equipment; DN. Other production (36.1. Furniture production; 36.2. Jewelry production).

[7] Construction firms include such productions of activities as F. Construction.

[8] Firms, that specialize in service production, include production of activities such as G. Wholesale and retail trade; maintenance of motor vehicles, motorcycles, household goods and personal appliances; H. Hotels and restaurants; J. Financial activities; K. Transactions with real estate, rental and provision of services; L. Public administration and military security; compulsory social security; M. Education; N. Healthcare and social services; O. Provision of other public, social and personal services.

[9] Transportation firms include production of such activities as I. Transport and communications.

Figure 1.Basic agents and relationships in the agent-based models



Legend in the model: 1 – households buy final products; 2 – households use firms' services; 3 – households pay taxes; 4 – households receive salary for working in final processing firms; 5 – households buy residence; 6 – households receive salary for working in construction firms; 7 – state regulate external market; 8 – households receive salary for working in firms providing services; 9 – final processing firms buy products of construction firms; 10 – final processing firms buy products of construction firms; 11 – construction firms buy products of intermediate processing firms; 12 – extractive firms buy products of construction firms; 13 – firms providing services buy products of construction firms; 14 – intermediate processing firms buy products of extractive firms; 15 – final processing firms buy products of intermediate processing firms; 16 – final processing firms buy products of firms providing services; 17 – intermediate processing firms buy products of firms providing services; 18 – extractive firms buy products of firms providing services ; 19 – construction firms buy products of firms providing services; 20 – households receive salary for working in intermediate processing firms; 21 – households receive salary for working in extractive firms; 22 – firms providing services pay taxes; 23 – extractive firms pay taxes; 24 – final processing firms pay taxes; 25 – construction firms pay taxes; 26 – intermediate processing firms pay taxes; 27 – state collect taxes; 28 – firms pay to transportation firms for goods portage; 29 – households receive salary for working in transportation firms; 30 – state pay transfers to households.

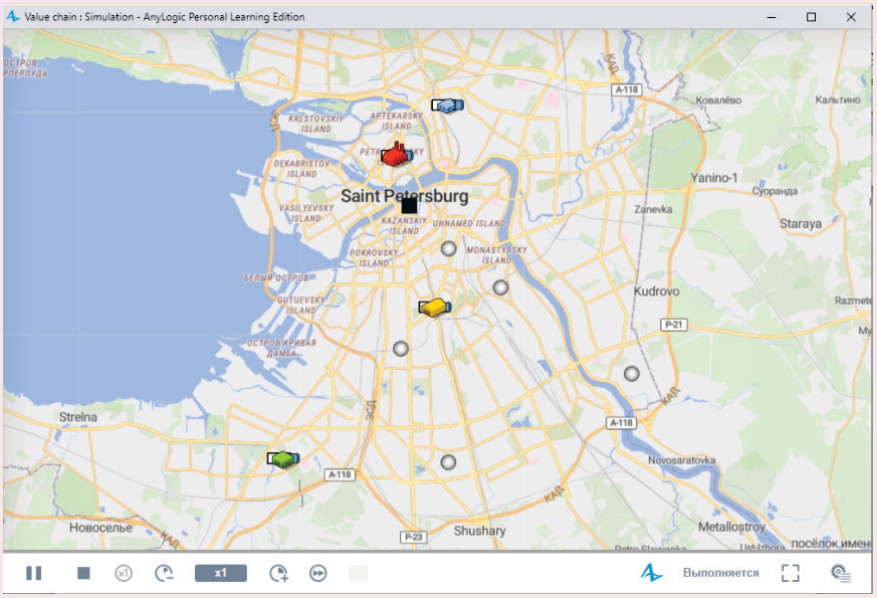
Source: own calculations.

The model is implemented in the AnyLogic simulation environment. We describe a computational algorithm that interests us at this stage of the research issues with no details of the characteristics of the model's capabilities – impact assessment for the regional economy from changes in consumer demand and "lengthening" of the value chains. We add that, for the most optimal solution of this problem, the methodological tools development contributes to the study of questions about stimulating the consumption of final processing products [12]. Final consumption, as an element of the reproductive system, is the most important factor in economic growth, and, in turn, regulation of final consumption implies stimulating consumer demand [13–16].

Assessing the consequences of consumer demand changes is carried out as follows. At the initial stage, the model is initialized, information is read from the databases: agents' geographical coordinates, belonging to a particular region, intersectoral relations, income and taxes. Agents are located and interact on the built-in GIS-map, their location (latitude and longitude) is taken from the corresponding database table. Coordinates are assigned to all firms, except for transport ones (their location is a function of the location of interacting firms). Households in each region are located in the central parts of cities (it is possible to assign them a different location). An example of placing agents in one of the regions is shown in *figure 2*.

Households form applications for the required products (taking into account the agents' location, transport tariffs). In this case, it becomes necessary to add customer requests as a new agent. In the agent diagram, parameters are added, and the properties indicate the type of the corresponding agent sending the request. The request for consumed products of a particular region is read from the table by adding several parameters to the agent diagram (in this case, the region in which the agent is located and the consumed products). To bind to

Figure 2. Agents' location in Saint Petersburg



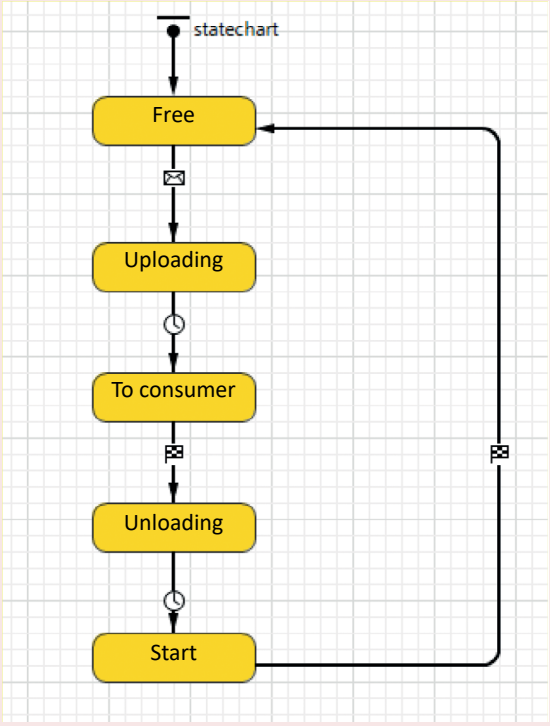
Source: own calculations are based on the AnyLogic software product.

the database, the SQL query constructor is used which allows visually generating queries to the built-in AnyLogic database. The final output value of each household agent will be directly read from the table by comparing the "region" parameter with the corresponding column. In addition, a cyclic event is added to the agent diagram which is triggered by Java code that indicates the formation of new requests from households and their sending (function send) to the agent.

Then, agents interact through the network of contacts, and applications are received and processed by final processing firms. Using elements of system dynamics and the process modeling library, the production process is launched along the entire technological chain (taking into account the technological coefficients from the tables "input – output"). After manufacturing, a final product is transported to a consumer. As soon as the required quantity of products is formed, a transport is captured to deliver it to the agent who submitted the application. Products are delivered before calling the stopDelay function in the delay "delivering" block after which the transport is released, sent back to the company, and the request is deleted (block Sink). The state diagram of the transport company is in *figure 3*.

Agents make payments to each other (pay for consumed goods, issue wages, transfer taxes, etc.). In the future, household incomes are regulated and a new period begins. The consequences of the VC "lengthening" are evaluated in a similar way, except that the final stages of the period regulate the output of final processing firms (as a palliative of "lengthening"). The corresponding change in output, employment and payroll fund

Figure 3. State diagram of transport firm



Source: own calculations are based on the AnyLogic software product.

is calculated for the sectors of the regional economy by summing up the microdata of the lower level agents.

Data sources

An important step in building an agent-based model involves setting the initial state of the system and filling it with adequate statistical data. Agreeing with the approach [6; 17; 18], at the stage of the model initialization, we used regional tables "input – output" which characterize the incoming and outgoing flows of goods and services by economic sectors (one agent presents each sector in the model) and provide information about their relationships with suppliers and consumers. The creation of small-sized tables "input – output" for the studied regions was carried out according to the author's methodology (developed under the RFBR grant 16-06-00136) on the basis of the most accessible information by regionalizing the Rosstat's basic tables "input – output" in Russia for 2011[11].

Research results

Characteristics of VC regions

We tested the model on materials from three technologically related regions of the North-western Federal District: the Republic of Karelia, the Vologda Oblast, and St. Petersburg.

These territories specialize in the goods production of different processing depth. Extractive industries play an important role in the economic structure of the Republic of Karelia (almost 25% in the structure of product shipment; *Tab. 1*). Mined in the Republic, iron ores provide more than half of the demand for raw materials from metallurgical production in the Vologda Oblast. In turn, the Vologda Oblast specializes in the intermediate processing of iron ore raw materials (metallurgy occupies 64% of the region's product shipment), producing various types of finished rolled ferrous metals. St. Petersburg produces on average even more "final" products. The finishing industry occupies the largest share among the regions in its economic structure. The city actively uses the existing metalworking and mechanical engineering capacities which account for more than a third of the sector's output.

The regions' location along the metallurgical value chain determines the fact that they are major trading partners. The Republic of Karelia sends almost 7% of its output to the Vologda Oblast (for comparison, 6.6% is to other regions; *Tab. 2*). The ninth part of deliveries of Vologda goods to Russian regions falls on

Table 1. Extended economic structure, % to the total

Economy sector	Republic of Karelia	Vologda Oblast	Saint Petersburg
Mining	24.9	3.4	0.4
Intermediate processing	13.5	68.0	43.4
Final processing	9.7	5.9	7.8
Construction	3.5	7.5	6.2
Transport	7.6	6.8	17.7
Services	40.8	8.4	24.5
Total	100.0	100.0	100.0
Source: Rosstat data on the volume of the shipped products.			

[11] The choice of 2011 is determined by two points: 1) for 2011, Rosstat developed basic tables "input – output", and in a more detailed nomenclature than for 2016 (126 vs. 95 products) which is important for further regionalization of tables "input – output"; 2) statistics on interregional product deliveries for 2011 contain "confidential" data that are hidden in publications of subsequent years in accordance with Federal Law no. 282-FZ "On official statistical accounting and the system of the state statistics in the Russian Federation" (Art. 4, P. 5, Art. 9, P. 1), dated November 29, 2007.

Table 2. Territorial structure of goods export, % to the total

Territory	Region – supplier		
	Republic of Karelia	Vologda Oblast	Saint Petersburg
Republic of Karelia	64.2	0.2	0.3
Vologda Oblast	6.9	41.2	0.2
Saint Petersburg	1.2	3.6	25.2
Other Russia's regions	5.4	30.7	69.3
Export	22.3	24.1	5.0
Total	100.0	100.0	100.0
Source: Rosstat data.			

St. Petersburg; the goods export produced in St. Petersburg outside the city exceeds 74% of production volumes.

These data prove that the regions' economy is tied to functioning within the existing interregional value chains. Changing the VC characteristics significantly influences the economic development and population's standard of living. Let us evaluate the consequences of some possible transformations based on the agent-based model that we have developed.

Consequence assessment of consumer demand growth

Let us assume that the consumer demand has increased for the corresponding goods and services in the regions as a result of household income support (or other factors). The final consumption build-up will lead to the main economic indicators growth for the full range of economic activities.

According to our calculations, consumer demand stimulation in the Republic of Karelia by 10% of the base level will contribute to an increase in output in the economy as a whole by 6.8% (with a multiplier of output of 1.91[11]) including the final processing industries – by 7% (*Tab. 3*). The number of employees, involved in production, will grow by 16.7 thousand people. The changes will also affect the payroll fund which will increase by almost 7.6 billion rubles. The average salary in the region will be higher by 100 rubles, or 0.25%. GRP growth will be 3.1%.

Table 3. Economic effects of consumer demand increase by 10% in the Republic of Karelia

Indicator	Mining	Intermediate processing	Final processing	Construc-tion	Transport	Services	Economy in general
Basic final consumption (2011), mil. rub.	3,918	10,659	14,979	53	5,945	72,235	117,112
Basic output, mil. rub.	71,970	58,510	32,693	22,462	17,529	98,208	301,373
Basic number of employees, people	14,081	24,730	13,351	9,147	30,357	114,450	206,115
Basic payroll fund, mil. rub.	4,394	14,187	3,530	3,992	11,035	62,569	99,707
Final consumption increase by 10%, mil. rub.	392	1,066	1,498	5	595	7,224	11,711
Output increase, %	2.4	7.4	7.0	1.8	10.0	10.3	6.8
Increase the number of employees, people	237	1,727	537	67	1,941	11,668	16,676
Payroll fund increase, mil. rub.	107	802	161	-27	1,004	5,027	7,573
Source: own calculations are based on the developed ABM.							

[11] This multiplier characterizes the change in output caused by the change in final consumption.

Table 4. Economic effects of consumer demand increase by 10% in the Vologda Oblast

Indicator	Mining	Intermediate processing	Final processing	Construc-tion	Transport	Services	Economy in general
Basic final consumption (2011), mil. rub.	8,572	23,324	32,777	116	13,010	158,061	256,258
Basic output, mil. rub.	33,354	414,242	49,329	84 087	66,540	144,759	792,311
Basic number of employees, people	20,618	77,217	15,858	24 109	36,329	189,343	363,474
Basic payroll fund, mil. rub.	7,517	39,300	4,997	9 619	17,599	71,794	150,824
Final consumption increase by 10%, mil. rub.	857	2,332	3,278	12	1,301	15,806	25,626
Output increase, %	11.3	2.3	10.2	1.1	5.8	15.3	5.7
Increase the number of employees, people	2,228	1,663	1,516	157	1,994	28,802	36,861
Payroll fund increase, mil. rub.	749	797	409	3	915	10,859	14,231
Source: own calculations are based on the developed ABM.							

The growth of final household consumption by 10% in the Vologda Oblast will ensure an increase in GRP by 2.1% (*Tab. 4*). The number of employees will rise by 36.8 thousand people. It is notable that, despite a significant increase in the payroll fund (by 14.2 billion rubles), the average salary in the region will decrease by 209 rubles, due to the fact that the economic structure is dominated by intermediate processing industries, where wages are higher than in the stimulated final processing sector. Gross output in the economy as a whole will increase by 5.7% and by 10.2% in the final processing sector. The output multiplier will be 1.91.

In St. Petersburg, a 10% increase of consumer demand will stimulate total output by 1.1% (*Tab. 5*). A number of people employed in the production will grow by 24.2 thousand people; the payroll fund will rise by 17.6 billion rubles. The average salary will slightly increase in the city (by 25 rubles, or by 0.04%). The greatest impact of the final consumption stimulation will be on the output of final processed goods (+1.8%). Positive changes will also be notable in the additional growth in GRP which will amount to 0.51%. In general, the output multiplier in St. Petersburg will reach 2.03.

As we can see, consumer demand stimulation has a significant impact on the regional economic development. The calculated multipliers of output, showing its full growth, the initial source of which was the final demand for products, are quite high and reach 2.03. Thus, consumer demand increase by 1 ruble stimulates the production of goods and services in the economy by 2 or more rubles.

Table 5. Economic effects of consumer demand increase by 10% in St. Petersburg

Indicator	Mining	Intermediate processing	Final processing	Construc-tion	Transport	Services	Economy in general
Basic final consumption (2011), mil. rub.	12,056	32,802	46,098	163	18,297	222,296	2,049,289
Basic output, mil. rub.	28,237	1,944,230	401,065	334,949	667,948	2,550,757	5,927,186
Basic number of employees, people	6,560	289,317	67,007	124,156	269,941	1,325,471	2,082,453
Basic payroll fund, mil. rub.	8,756	232,793	40,131	70,554	217,514	891,261	1,461,008
Final consumption increase by 10%, mil. rub.	1,206	3,280	4,610	16	1,830	22,230	204,929
Output increase, %	6.8	0.8	1.8	0.4	0.9	1.3	1.1
Increase the number of employees, people	1,219	2,076	1,067	424	2,316	16,620	24,222
Payroll fund increase, mil. rub.	1,660	1,651	635	198	1,847	11,143	17,634
Source: own calculations are based on the developed ABM.							

Consequence assessment of VC "lengthening"

Showing the income growth importance and the consumer demand stimulation to the economy, let us assume that the purposeful policy result on VC development, implementation point of investment in the regions increased the output of final processing sector (introducing a new production of finished metal goods, engineering products, food, textile, pharmaceutical, and other consumer goods). Where is the final processing development more profitable? We will compare the three territories increasing the output of the final processing sector by a fixed amount of 1 billion rubles.

If the determining criterion is to choose the employment growth and employees' salaries (it is a significant source of income tax for individuals in the regional budget), the Republic of Karelia will be the leader. The payroll fund increase will amount to 412 million rubles which is 18% higher than the level of the Vologda Oblast and 8% higher than in St. Petersburg. The same situation will be with the employees' number: in the Republic of Karelia, its value will outstrip the Vologda Oblast by 8%, St. Petersburg – by 2.1 times (*Tab. 6*).

However, if we place stake on the absolute increase in output (the volume of which largely determines the value added tax credited to the Federal budget), St. Petersburg will become the leader due to the current economic structure. The total growth in output will be 6.4% higher than in the Republic of Karelia and 5.7% higher than in the Vologda Oblast.

Thus, the decision to choose a place for the development of a particular type of production is not always clear; it requires taking into account many factors (including those not shown by us) and implementing appropriate model calculations.

Conclusion

In the study, we attempted to assess the consequences of stimulating consumer demand and "lengthening" value chains for the regional economy using an agent-based model of the

Table 6. Economic effects of output growth in the final processing sector by 1 billion rubles

Indicator	Mining	Intermediate processing	Final processing	Construction	Transport	Services	Economy in general
Republic of Karelia							
Basic output, %	0.4	0.5	3.1	0.1	0.4	0.3	0,7
Basic output, mil. rub.	314	314	1,000	18	74	249	1,969
Increase of the number of employees, people	61	133	408	7	128	291	1,028
Payroll fund increase, mil. rub.	19.2	76.1	108.0	3.1	46.5	158.9	412
Vologda Oblast							
Basic output, %	0.9	0.1	2.0	0.0	0.1	0.2	0.3
Basic output, mil. rub.	316	316	1,000	18	74	251	1,983
Increase of the number of employees, people	195	59	324	5	41	329	953
Payroll fund increase, mil. rub.	71.2	30.0	102.0	2.0	19.7	124.6	350
St. Petersburg							
Basic output, %	1.2	0.02	0.25	0.01	0.01	0.01	0.04
Basic output, mil. rub.	348	354	1,000	20	86	283	2,096
Increase of the number of employees, people	81	53	168	8	35	147	492
Payroll fund increase, mil. rub.	107.8	42.4	100.5	4.3	28.1	99.0	382
Source: own calculations are based on the developed ABM.							

interregional value chains functioning. The results of the model calculations allow us to draw the following conclusions.

1) Growing in the final consumption level ensures an increase in the output of consumer products and, as a result, induces the industries' development that are technologically located lower in the corresponding value chains (i.e., in the intermediate processing and mining sector). The magnitude estimation of these effects is facilitated by using the information on the level of intersectoral interactions from the tables "input – output" in modeling. Increased consumer spending provide, in addition to the profit growth of businesses serving the consumer sector (a large share of goods and services output), the increase of resources for the organizations of other VC sites, some of which may be subsequently directed into investment. To stimulate final consumption, it is important to maintain the level of population's income and social expenditures of the budget, ensuring, at least, the increase in salaries in the public sector [19; 20]. Another direction of growing the population's income is to increase the efficiency and productivity of labor. This will be facilitated by stimulating the introduction of social innovations, advanced management and production technologies, improving working conditions at enterprises, implementing policies to prevent the qualified personnel's emigration, reducing diseases and early mortality.

2) VC "lengthening" (which we simply understand as an increase of the production capacity of the final processing sector) brings various economic effects for the national economy, depending on the spatial location of enterprises. In our opinion, it is important to model various scenarios at the stage of their design in order to choose the optimal configuration of interregional, etc.

Further research prospects are related to the improvement of the developed model and the expansion of its analytical capabilities. It is planned to raise the number and types of agents, increase the aggregation of economic sectors, develop interaction in production chains, add budget-tax and investment blocks, assess the consequences of import substitution, etc.

The novelty of the research defining its contribution to the science is in working out the methodological tools for modeling interregional value chains, based on a synthesis of agent-based and cross-sectoral approaches that take into account interregional interaction and carry out variant calculations of events. The article materials can be useful for decision-makers in justifying economic policy at the regional level.

Acknowledgment

The authors are deeply grateful to the anonymous reviewers for a detailed article analysis, valuable comments and suggestions for its revision.

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Received October 13, 2020.

DOI: 10.15838/esc.2020.6.72.7
UDC 004.942, LBC 22.18

Neural Network Forecasting Algorithm as a Tool for Assessing Human Capital Trends of the Socio-Economic System

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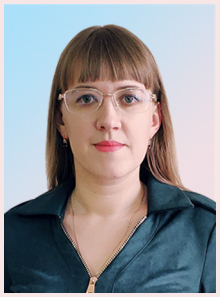

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Abstract. The article addresses the issue of neural network forecasting of human capital size, structure, and dynamics. The object of the research is the socio-economic system. The subject of the study is the practice of applying neural network models to forecasting socio-economic indicators, human capital in particular. The purpose of this work is to apply neural network modeling and adapt its algorithms to build a forecast of the studied indicator for the future. The statistical base is data on demography, the investment volume in human capital of the regional economic system, as well as the indicators of socio-economic development. The investment volume in human capital is determined by budget and private citizens' expenditures. To forecast the human capital dynamics the authors used the values of investment volumes the forecast of which, in turn, is built using a neural network modeling. The neural network model used in this study is a multi-layer fully connected perceptron with a sigmoid logistic activation function.

For citation: Ketova K.V., Vavilova D.D. Neural network forecasting algorithm as a tool for assessing human capital trends of the socio-economic system. *Economic and Social Changes: Facts, Trends, Forecast,* 2020, vol. 13, no. 6, pp. 117–133. DOI: 10.15838/esc.2020.6.72.7

Neural network modeling of forecast values of investment volumes has shown its effectiveness. Human capital assessment for the period of 2000–2018 and its forecast for the period of 2019–2023 are based on the example of the regional economic system of the Udmurt Republic. Our calculations show that the highest growth rate of the studied indicator has been demonstrated since 2013, and its further increase is predicted. The results obtained correlate qualitatively with the dynamics of changes in the Russian human development index, determined by the UN experts. The proposed method of calculating and forecasting human capital can be used to assess and compare the socio-economic situation of Russia's regions.

Key words: human capital, neural network modeling, algorithm forecast, investments, socio-economic system.

Introduction

Building development strategy for the socio-economic system which is based on a stable growth of its indicators is an urgent task. When solving this problem, a mathematical modeling tool should be used, as it allows building economic dependencies for the future with a given accuracy.

The strategy for the socio-economic system development involves the construction of schemes for financing industrial and social spheres of activity. The production sphere is characterized by the structure and size of production capital (PC), the methodology for calculating which is well known. In recent years, human capital (HC) has been increasingly used to assess the social sphere which is a leading factor in determining high development rates in modern economy. Consequently, issues related to the human capital study become important and relevant.

The HC concept appeared in science in the 20th century in the works of American scientists-economists J. Mincer [1], T. Schultz [2] and G. Becker [3]. The impetus for the HC theory creation was statistical data on the growth of the developed countries' economies. The analysis of real processes of development and growth in modern conditions has led to the HC study as the main productive and social development factor. For creating the foundations of the human capital theory, the Nobel prizes in Economics were awarded (T. Schultz in 1979 and G. Becker in 1992). S. Kuznets made a significant contribution to the HC theory creation. He showed that human capital is the main dominant factor in the possible stable growth of developing countries' economies [4].

Among the scientists who have made the greatest contribution to the HC theory development are M. Blaug, M. Grossman, M. Perlman, L. Thurow, F. Welch, B. Chizwick, J. Kendrick, R. Solow, R. Lucas, C. Grilliches, I. Fischer, E. Denison and other economists, sociologists and historians. Among modern Russian researchers dealing with the HC problems, we can mention S.A. Dyatlov, R.I. Kapelyushnikov, M.M. Kritskii, S.A. Kurganskii, O.I. Ivanov, and others. There are several approaches to assessing human capital. The models of I. Ben-Porat [5], D. Heckman [6], A.S. Akopyan, V.V. Bushuev and V.S. Golubev [7], S.Yu. Malkov, K.A. Bolotova, and O.I. Davydova [8].

Building a general methodology for the HC calculating is a rather difficult task, as there is a large proportion of subjective assessments when modeling it. There are also different positions on the basis of which the HC concept is formulated, in particular, it can be studied from the point of view of the quality of human life

[9], its ability to perform high-performance activities [10], as the amount of income that a person can receive [11] or as the amount of investment in the social sphere [12]. In 1990, the United Nations Development Program proposed a methodology for assessing the HC level based on the calculation of the human development index[1].

Whatever approach the researchers would chose to assess HC, it is important that at present this indicator should be considered as one of the most important factors that ensure the socio-economic system development [13–17].

In our work, we used an integral economic and mathematical HC which includes its quantitative and qualitative characteristics [18]. Based on this pattern, the HC value is calculated. We performed the HC forecast using a neural network algorithm.

Neural network modeling is one of the mathematical methods for studying various processes and phenomena. It is used for solving problems of data mining and forecasting [19–22].

Initially, artificial neural networks (ANN) were constructed as a result of studying the nervous system of a living organism [23]. Neural network is in a certain way an analogous to the brain in terms of its qualitative structure and the number of neurons it contains.

In recent decades, neural networks have been widely used for forecasting. Forecasting is one of the most popular, but also the most complex tasks of ANN. The forecast error always depends on the selected pattern, the availability and quality of the source data.

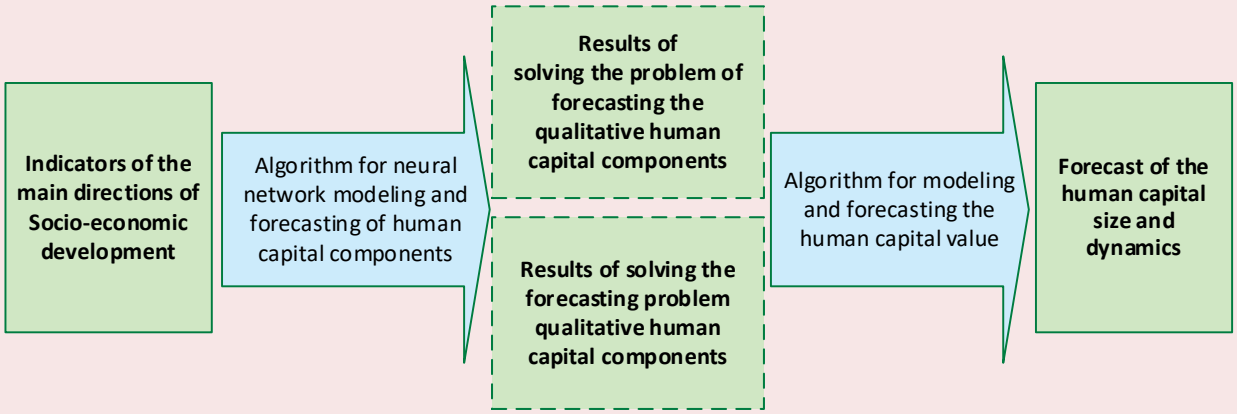
Neural networks have the following advantages in making forecasts: effectiveness in solving unformalized or poorly formalized tasks; resistance to frequent changes in the environment; efficiency when working with a large amount of contradictory or incomplete information. These advantages are relevant including the cases when applying neural networks to the forecasting socio-economic processes and phenomena.

The advantages associated with the use of neural network patterns and their modifications in the analysis of socio-economic processes and phenomena are presented in [24, 25]. The authors show that neural network patterns have the property to take into account the influence of implicit factors and include non-obvious mathematical connections in the study that are difficult to find using classical econometric patterns, the regression ones in particular.

ANN were first mentioned in the 1940s. It is recognized that the neural networks theory was designated as a scientific direction in 1943 in the work of W. McCulloch and W. Pitts [26], where the authors showed that any arithmetic or logical function can be implemented using a simple neural network. Among the fundamental works, we should also highlight the pattern of D. Hebb [27] who proposed the first learning algorithm in 1949. In 1958, F. Rosenblatt constructed a pattern of a perceptron containing a single layer [28]. After some cooling to the ANN, a new wave of interest emerged in the 1970s. Thanks to the research of T. Kohonen, S. Grossberg and D. Anderson, the foundation was completed, on the basis of which it became possible to build and use multi-layer neural networks [29; 30]. In 1974, P. Werbos developed a basic algorithm for training multi-layer neural networks which was widely used in practice [31]. Among the researchers in the ANN, one can also distinguish M. Minsky [32], K. Fukushima [33], J. Hopfield [34], S. Haykin [35], R. Hecht-Nielsen [36], and others. Recent research on the formation of

[1] *The Yearbook of the United Nations*. Available at: https://unyearbook.un.org/

Figure 1. Research structure



Source: own calculations.

neural network modeling algorithms, dynamic series analysis, and forecasting is presented, for example, in [37–40].

We consider the problem of forecasting the human capital of a socio-economic system based on a neural network algorithm. The study structure is shown in *Figure 1*. Indicators of socio-economic development directions are determined in accordance with the work [41]. The neural network modeling algorithm and forecasting of the HC components allows making their forecast. The algorithm for modeling and predicting the HC value uses the results of forecasting the HC components to calculate its total value.

Economic and mathematical pattern of human capital

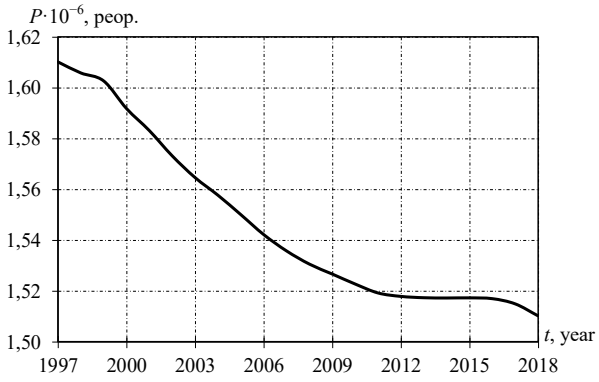
The HC carriers are demographic elements each of which is characterized by age τ at a time t. The number of demographic elements determines the quantitative HC characteristics. To implement an effective demographic policy, it is of great importance to conduct research such as the analysis of modern demographic processes and forecasting the population size and structure based on it, taking into account the specifics of birth rate, life expectancy, migration processes, and mortality.

Figure 2 shows the dynamics of the total population for the 1997–2018 period using the example of one of the regions of the Russian Federation – the Udmurt Republic (UR). *Figure 3* shows the dynamics of fertility and mortality.

The calculation of the HC value should be carried out taking into account the demographic structure. The distribution of demographic elements by age $\rho(t,\tau)$ is important in this case. Under the demographic element here and further we will understand a representative of the population – an individual who at the time t under consideration is characterized by the age τ. *Figure 4* shows the age distribution of the UR population for 2008 and 2018, respectively. The function $\varepsilon(t,\tau)$ sets the percentage of the age τ population participating in social production per t year. The problem of modeling and forecasting demographic dynamics is presented in detail in this work [42].

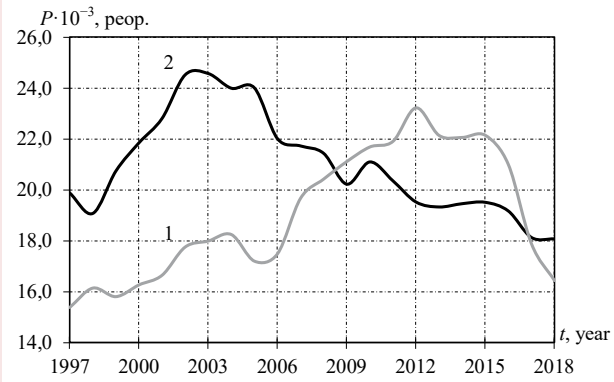
To calculate the human capital value of the economic system $H(t)$, the pattern [18] is used according to which the total value of the

Figure 2. UR population dynamics



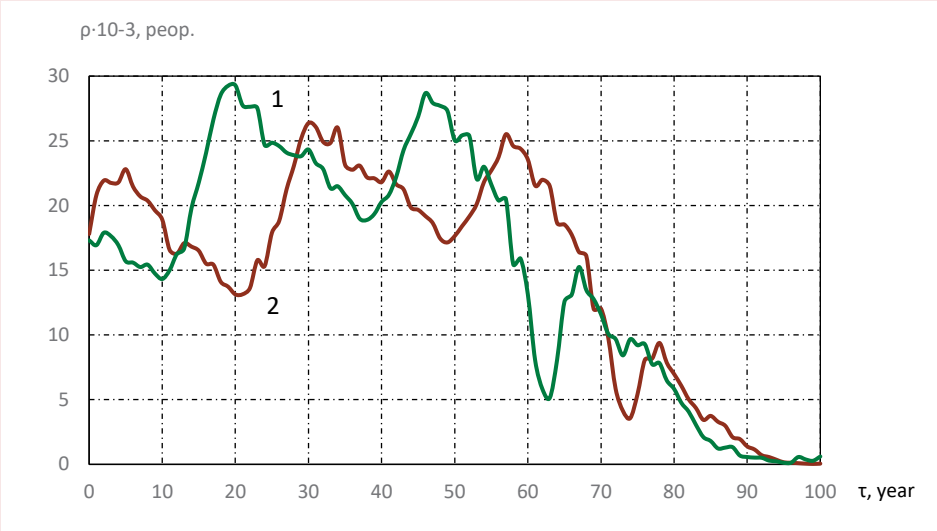
Source: Total population of the Udmurt Republic. Available at: https://udmstat.gks.ru/folder/51924

Figure 3. UR population dynamics of birth rate (1) and death rate (2)



Source: Population of the Udmurt Republic by gender and age. Available at: https://udmstat.gks.ru/folder/51924

Figure 4. The density of the UR population distribution by age: 2008 (1); 2018 (2)



Source: Population movement of the Udmurt Republic. Available at: https://udmstat.gks.ru/folder/51924

population HC participating in social production is determined from the expression:

$$H(t)=\int_0^{\infty}\sum_{i=1}^{3}\alpha_i h_i(t,\tau)\varepsilon(t,\tau)\,\rho(t,\tau)d\tau. \qquad (1)$$

Functions $h_i(t,\tau)$ are the quality HC components: health i=1, education i=2, and culture i=3. Investment in health raise the general level of health in society which contributes, on the one hand, extending the economically active life of individual demographic item, and, on the other hand, the increase in the number of economically active population elements due to the reduction of mortality. Investment in education contributes to improving the overall skills level in the regional labor market, opening up the greatest reserves for improving the modern economy

efficiency. Investments in culture improve the human environment, form moral values, and increase the creative potential of the individual which, of course, affects the region's socio-economic development.

The specific (per demographic unit) HC average value is determined by a linear combination:

$$h(t,\tau) = \alpha_1 h_1(t,\tau) + \alpha_2 h_2(t,\tau) + \alpha_3 h_3(t,\tau), \quad (2)$$

$$\alpha_i \in (0,1); \sum_{i=1}^{3} \alpha_i = 1, \quad (3)$$

where: α_i are the corresponding weight coefficients for the HC components; values $h_i(t,\tau)$ are measured in monetary units.

During the research, the hypothesis of the equivalence of the HC components was accepted: $\alpha_i = 1/3, i = \overline{1,3}$.

The evolution of each of the HC components is described by the equation:

$$\frac{\partial h_i(t,\tau)}{\partial t} + \frac{\partial h_i(t,\tau)}{\partial \tau} = -\nu_i h_i(t,\tau) + s_i(t,\tau) + p_i(t,\tau). \quad (4)$$

In formula (4), the following notations are used for each HC component: $s_i = s_i(t,\tau)$ – specific state expenditures; $p_i = p_i(t,\tau)$ – specific private investment; $\nu_i = \nu_i(t,\tau)$ – the coefficient of disposal which is estimated using the identification algorithm [43].

The initial conditions for $t = t_0$ are as follows:

$$h_i(t_0,\tau) = h_{i0}(\tau), \ (i = 1, 2, 3), \quad (5)$$

where: $h_{i0}(t)$ – known functions.

At the left end of the demographic curve, the boundary conditions are as follows:

$$h_i(t,0) = 0, \ (i = 1, 2, 3); \quad (6)$$

at the right end, where $i = 1, 2$ the following should be written:

$$h_i(t,\infty) \approx h_i(t,\tau_m) = 0, \quad (7)$$

where: $\tau_m = \tau_m(t)$ – survival time δ of the population's percent ($\delta = 1$–5%).

It is obvious that the coefficients of disposal ν_i are weakly time-dependent. The age dependence for functions $\nu_i = \nu_i(\tau)$ $(i = 1, 2)$ is taken as follows:

$$\nu_i(\tau) = \begin{cases} 0, & \tau \le \tau_{ai}, \\ (s_i(t,\tau) + p_i(t,\tau))\{\exp[\varepsilon_i(\tau - \tau_{ai})] - 1\}, & \tau_{ai} \le \tau \le \tau_m, \end{cases} \quad (8)$$

Where the unknown parameters (s_i, ε_i) are determined from the conditions:

$$(s_i(t,\tau) + p_i(t,\tau))\{\exp[\varepsilon_i(\tau_m - \tau_{ai})] - 1\} = 1, \quad (9)$$

$$\int_0^{\tau_m} [s_i(t,\tau) + p_i(t,\tau)] d\tau = \int_{\tau_{ai}}^{\tau_m} \{(s_i(t,\tau) + p_i(t,\tau))(\exp[\varepsilon_i(\tau - \tau_{ai})] - 1)\} h_i(t,\tau) d\tau. \quad (10)$$

Here τ_{ai} is the upper limit of the active period of physical condition (i=1) or work activity (i=2).

When performing specific calculations for the UR economic system, we have analyzed demographic data for the period of 2000–2018, and found that the age limit of the economically active age of the UR population is 20–60 years old.

Unlike other components, the cultural HC component is not subject to disposal, so $\nu_3 \equiv 0$.

For the equation (4) that sets the evolution of the HC components, the age distribution of the specific components of state budget expenditures $s_i(t,\tau)$ is determined by the formulas:

$$s_i(t,\tau) = \sum_{Ni} \frac{S_{Ni}(t)}{\int_{\tau_{1Ni}}^{\tau_{2Ni}} \rho(t,\tau) d\tau},$$
$$S_{Ni}(t) = \begin{cases} S_{Ni}(t,\tau), & \tau \in [\tau_{1Ni}, \tau_{2Ni}], \\ 0, & \tau \notin [\tau_{1Ni}, \tau_{2Ni}]. \end{cases} \quad (11)$$

Here $S_{Ni}(t)$ is the amounts budgeted for the corresponding item of expenditure N_i (N_i – numbering of budget items spent on health (i=1), education (i=2), and the development of the cultural HC component (i=3)). In accordance with formula (11), these amounts will be distributed evenly over the corresponding periods of a person's life $[\tau_{1Ni}, \tau_{2Ni}]$ and the number of demographic units in these periods.

For equation (4), the age distribution of the specific components of private expenditures $p_i(t, \tau)$ aimed at HC increasing is written by analogy with (11), assuming that a person uses various amounts of money spent on health (i=1), education (i=2), and culture in different periods of life (i=3):

$$p_i(t,\tau) = \sum_i \frac{P_i(t)}{\int_{\tau_{1i}}^{\tau_{2i}} \rho(t,\tau)d\tau}, \qquad P_i(t) = \begin{cases} P_i(t,\tau), & \tau \in [\tau_{1i}, \tau_{2i}], \\ 0, & \tau \notin [\tau_{1i}, \tau_{2i}]. \end{cases} \tag{12}$$

Algorithm for neural network forecasting of human capital

Let us build a neural network for solving the problem of predicting human capital. *Figure 5* shows a neural network element – a neuron with m inputs and an output. This construction of a neuron is called a perceptron. An artificial neural network is a way to assemble neurons into a network to solve certain tasks. The trained artificial neuron works as follows: each input is multiplied by certain weights; then everything is summed and run through a nonlinear activation function, and the result is fed to the output. All the neurons are collected into layers. Basic computing operations are performed on internal hidden layers.

Another task is to train the neuron. Training consists in finding the correct weight information which is adjusted based on the task and error (the difference between the calculated and ideal output values). For this purpose, the error back propagation algorithm is used.

The input data is summed with weights w_j: $D = \sum_{j=1}^{m} w_j x_j$. The neuron's output has a logistic activation function $f(D)$ (Fig. 5) that converts the weighted sum D of the incoming signal (*Fig. 6*).

To forecast the investment volume in the social sphere, we construct a complex k-layer neural network with m inputs and l outputs (*Fig. 7*). The input data in the neural network pattern are the volumes of budget $\{S_i\}_{i=1}^{n=3}$ and private $\{P_i\}_{i=1}^{n=3}$ investment in the HC, the indicators of socio-economic development directions $\{I_i\}_{i=1}^{n=8}$. The deflator index K is used to account for inflationary processes. The output data of the neural network is the projected monthly volumes of budget and private investments in HC: $\{\widetilde{S}_i\}_{i=1}^{n=3}$ and $\{\widetilde{P}_i\}_{i=1}^{n=3}$.

For our task, we will consider budget investments in healthcare (x_1), education (x_2), and culture (x_3), as well as private investments in healthcare (x_4), education (x_5), and culture (x_6). The amount of investment in the social sphere

Figure 5. Artificial neuron

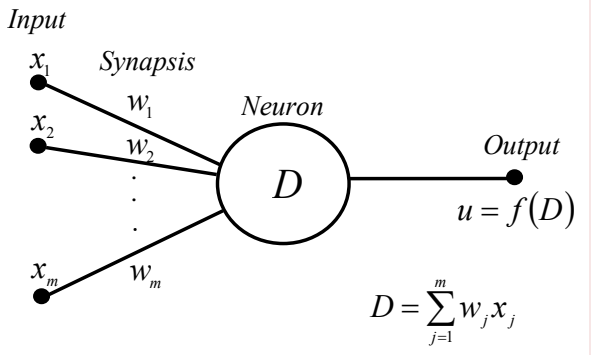


Figure 6. Activation function

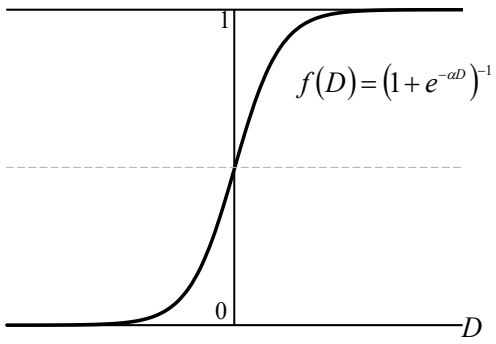
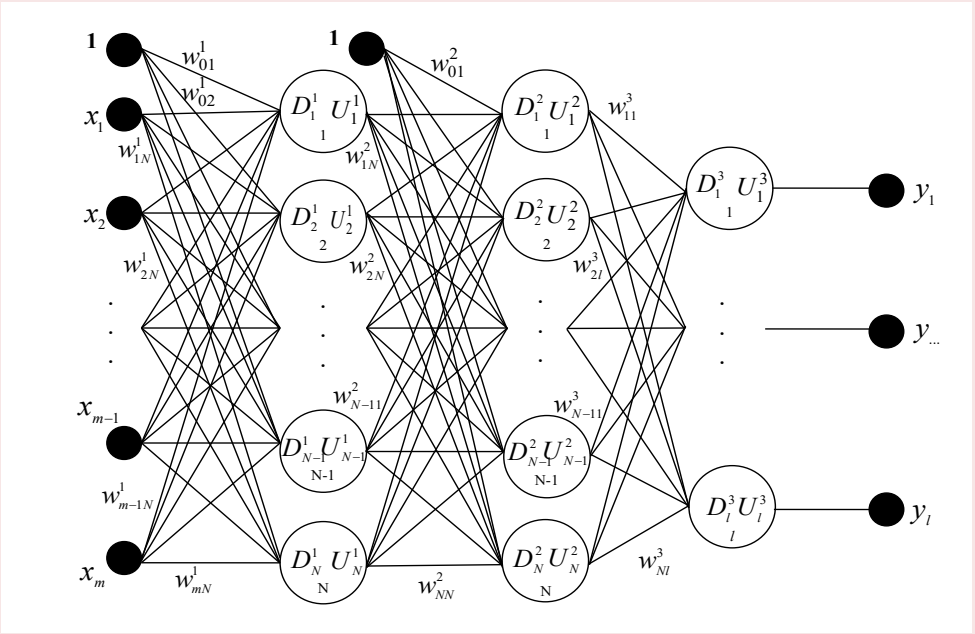


Figure 7. Neural network pattern used to forecast investments in human capital



Source: own calculations.

depends on many factors and environmental conditions. In the work of S.A. Ayvazyan [41] identified indicators that most strongly affect the quality of the social sphere, namely: gross regional product (x_7), average per capita monetary income (x_8), production of goods and services per capita (x_9), the area of housing commissioned (x_{10}), the number of registered crimes (x_{11}), natural population growth (x_{12}), mortality in working age (x_{13}), the minimum required monthly income (x_{14}).

Thus, $\{S_i\}_{i=1}^{n=3} = \{x_1, x_2, x_3\}$, $\{P_i\}_{i=1}^{n=3} = \{x_4, x_5, x_6\}$,
$\{I_i\}_{i=1}^{n=8} = \{x_7, x_8, x_9, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}\}$, $K = x_{15}$.

We will construct a neural network prediction algorithm for any case with any number of input variables. Figure 7 shows the neural network pattern underlying the algorithm.

Each layer of the neural network pattern contains N_p neurons $p=1,...,k$.

We will use the following notation: w_{ij}^p the weight coefficient of communication connecting the signal coming out of the (p-1) layer of the i-th neuron and entering the j-th neuron of the p-th layer. For each layer, the coefficients are represented as a matrix with the size $(N_{p-1}+1)\times N_p$:

$$\vec{W} = \left(w_{ij}^p\right),\ p=1,..,k;\ i=0,..,N_{p-1};\ j=1,..,N_p. \quad (13)$$

From an algorithmic point of view, the output values of the zero layer u_j^0 should be equated to the signals entering the neural network x_j, $x_0 \equiv 1$:

$$u_j^0 = x_j,\ j=0,..,m. \quad (14)$$

In other layers, the output values of neurons are calculated:

$$u_0^p = 1,\ u_j^p = f\left(d_j^p\right)\ p=1,..,k,\ j=1,..,N_p, \quad (15)$$

where $f\left(d_j^p\right)$ – nonlinear activation function of the, $f(t) = \left(1+e^{-\alpha t}\right)^{-1}$, α – a coefficient.

Let us denote d_j^p as the input signal in j-th neuron of the p-th neuron layer which is determined by the weighted sum of the incoming signals:

$$d_j^p = \sum_{i=0}^{N_{p-1}} w_{ij}^p u_i^{p-1},\ j=1,.,N_p. \quad (16)$$

The output values of the last k-th layer should match y_j:

$$y_j = u_j^k,\ j = 1,..,l\ , \qquad (17)$$

The training process consists of adjusting the weight coefficients w_{ij}^p. Based on the information about the values of variables at known points in time, the network determines their most likely values for the future. Statistical information on socio-economic indicators is divided into two sets: the training set and the test set which is a section of the retro-forecast.

To train the network, input data is fed to the inputs $\boldsymbol{x}_q = (x_{q1}, x_{q2},...,x_{qm})$ and the output values of the network are compared with the ideal (actually set) values, $\boldsymbol{r}_q = (r_{q1}, r_{q2},...,r_{ql})$, q=1,...,n.

The training set of data is used to implement an algorithm for training a multi-layer neural network using the method of back propagation of errors which is related to gradient optimization methods [44]. To determine the network weight coefficients $\vec{W} = \left(w_{ij}^p\right)$, the network training error is calculated using the formula:

$$E_q\left(\vec{W}\right) = \frac{1}{2}\sum_{j=1}^{l}\left(y_{qj} - r_{qj}\right)^2,\ q = 1,..,n, \qquad (18)$$

where y_{qj} is j-th output when the input of the q-th image.

When submitting the q-th observation, the coefficients will change as follows:

$$\vec{W}(q) = \vec{W}(q-1) + \left(-\lambda \cdot \nabla E_q\right), \qquad (19)$$

where $\vec{W}(q)$ – the vector state $\vec{W}$ after training the network by the q-th observation; $\lambda \in (0;1]$ – training rate of the network; ∇E_q – gradient of function $E_q\left(\vec{W}\right)$, when the input is submitted q-th image:

$$\nabla E_q = \left(\frac{\partial E_q}{\partial w_{ij}^p}\right),\ p = 1,..,k,\ i = 0..N_{p-1},\ j = 1,...,N_p\ . \qquad (20)$$

In the component form, the expression (20) is represented as:

$$w_{ij}^p(q) = w_{ij}^p(q-1) + \Delta w_{ij}^p,\ \Delta w_{ij}^p = -\lambda\frac{\partial E_q}{\partial w_{ij}^p}\ . \qquad (21)$$

Vector components (21) are written as follows:

$$\frac{\partial E_q}{\partial w_{ij}^p} = \frac{\partial E_q}{\partial u_j^p}\frac{\partial u_j^p}{\partial d_j^p}\frac{\partial d_j^p}{\partial w_{ij}^p}, \qquad (22)$$

where partial derivative $\frac{\partial u_j^p}{\partial d_j^p}$ in accordance with the derivative of the logistic function $\frac{\partial f(t)}{\partial d} = \alpha\, f(t)(1 - f(t))$ is represented as:

$$\frac{\partial u_j^p}{\partial d_j^p} = \alpha \cdot u_j^p \cdot \left(1 - u_j^p\right). \qquad (23)$$

Let us introduce a new variable δ_j^p as follows:

$$\delta_j^p = \frac{\partial E_q}{\partial u_j^p}\frac{\partial u_j^p}{\partial d_j^p}\ , \qquad (24)$$

$$\frac{\partial E_q}{\partial u_j^p} = \sum_{i=1}^{N_{p+1}}\frac{\partial E_q}{\partial u_i^{p+1}}\frac{\partial u_i^{p+1}}{\partial d_i^{p+1}}\frac{\partial d_i^{p+1}}{\partial u_j^p} = \sum_{i=1}^{N_{p+1}}\frac{\partial E_q}{\partial u_i^{p+1}}\frac{\partial u_i^{p+1}}{\partial d_i^{p+1}}w_{ji}^{p+1}. \qquad (25)$$

Then δ_j^p we can recursively calculate through the data of the (p+1)-th layer δ_j^{p+1}:

$$\delta_j^p = \left[\sum_{i=1}^{N_{p+1}}\delta_i^{p+1}w_{ji}^{p+1}\right]\cdot\alpha\cdot u_j^p\cdot\left(1 - u_j^p\right). \qquad (26)$$

When p=k from (16), (23) and (24), equating $u_j^k = y_{qj}$, we find:

$$\delta_j^k = \left[u_j^k - r_{qj}\right]\cdot\alpha\cdot u_j^k\cdot\left(1 - u_j^k\right). \qquad (27)$$

The last multiplier in formula (22), according to (16), is equal to: $\frac{\partial d_j^p}{\partial w_{ij}^p} = u_i^{p-1}$.

As a result, based on the formulas (21), (22), (24) we get the difference scheme:

$$w_{ij}^p(q) = w_{ij}^p(q-1) - \lambda\delta_j^p u_i^{p-1}. \qquad (28)$$

In order to train the network, you need to normalize the input and output data in the area of their definition. If it is known that $x_j \in [a_j - h_j;\ b_j + h_j]$, then the normalized input data has the following form:

$$\bar{x}_{qj} = \frac{x_{qj} - \left(b_j + a_j\right)/2}{\left(b_j - a_j\right)/2 + h_j},\ q = 1,...,n\ . \qquad (29)$$

Table 1. Budget and private investments aimed at the UR human capital development for 2000–2018 in the current prices

Indicator	Time frame, year	Year, mln. rub.									
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Expenditures of the UR consolidated budget and territorial state extra-budgetary funds[1)]											
Budget investments in health and sport		**1459.3**	**1652.8**	**2492.5**	**2704.0**	**3189.9**	**4790.4**	**6792.7**	**13846.9**	**15705.2**	**11632.4**
Health care	$1 \le \tau \le \tau_m$	1382.3	1593.7	2418.4	2495.5	2971.6	4537.7	6434.3	13116.4	14876.6	9697.7
Sport and physical education	$3 \le \tau \le \tau_m$	42.0	53.7	65.8	81.1	83.8	137.9	195.5	398.6	452.1	240.7
Other expenses	$1 \le \tau \le \tau_m$	35.0	5.4	8.3	127.4	134.5	114.8	162.8	331,9	376.4	1694.0
Budget investment in education		**2125.3**	**2535.7**	**3732.6**	**3954.6**	**4781.9**	**5425.5**	**7529.0**	**9224.9**	**10386.9**	**12386.9**
Preschool education	$3 \le \tau \le 6$	528.7	670.2	926.9	963.8	1144.8	1349.6	1872.8	2294.7	2583.7	3029.3
General education	$7 \le \tau \le 17$	1333.1	1566.3	2394.0	2448.4	3020.2	3403.2	4722.6	5786.4	6515.3	6752.7
Elementary vocational education	$14 \le \tau \le 17$	2.7	4.2	5.3	5.5	6.6	6.9	9.6	11.7	13.2	711.0
Intermediate vocational education	$18 \le \tau \le 21$	60.4	73.4	107.0	109.6	139.2	154.2	214.0	262.2	295.2	417.1
Retraining and developing skills	$25 \le \tau \le 59$	16.6	20.8	28.7	32.5	37.3	42.3	58.6	71.9	80.9	58.1
Higher professional education	$18 \le \tau \le 22$	5.3	9.4	8.8	9.4	10.5	13.4	18.6	22.8	25.7	–
Youth policy and health care for children	$3 \le \tau \le 59$	178.6	204.9	261.8	385.4	423.2	455.9	632.7	775.2	872.9	207.7
Other issues in education	$3 \le \tau \le \tau_m$	–	–	–	–	–	–	–	–	–	1211.0
Budget investment in culture		**307.7**	**319.8**	**475.5**	**584.6**	**661.9**	**2433.0**	**3099.3**	**4204.6**	**3230.0**	**2102.1**
Culture	$3 \le \tau \le \tau_m$	235.7	252.9	408.5	435.7	526.7	1874.7	2388.1	3239.7	2488.8	1397.6
Cinema	$3 \le \tau \le \tau_m$	16.2	3.2	4.0	3.4	3.5	13.5	17.2	23.3	17.9	0.2
Broadcast media	$3 \le \tau \le \tau_m$	28.3	34.9	24.9	79.9	72.1	298.8	380.6	516.3	396.6	78.9
Periodicals and publishing houses	$7 \le \tau \le \tau_m$	27.5	28.8	35.1	60.1	50.4	217.7	277.3	376.2	289.0	97.2
Other expenses in culture and mass media	$3 \le \tau \le \tau_m$	–	–	–	5.5	9.2	28.4	36.1	49.0	37.6	528.2
Total		**3892.3**	**4508.3**	**6700.6**	**7243.2**	**8633.7**	**12648.9**	**17421**	**27276.4**	**29322.1**	**26121.4**
Expenditures from the Federal budget of the Russian Federation and state extra-budgetary funds in UR[2)]											
Budget investment in health care	$1 \le \tau \le \tau_m$	*	*	*	*	*	*	*	*	*	*
Budget investment in education	$1 \le \tau \le \tau_m$	*	*	*	*	*	*	*	*	*	*
Budget investment in culture	$1 \le \tau \le \tau_m$	*	*	*	*	*	*	*	*	*	*
Total		*	*	*	*	*	*	*	*	*	*
Private investment of the UR population[3)]											
Private investment in health care	$1 \le \tau \le \tau_m$	412.2	654.0	875.7	1269.6	1677.3	2355.7	3080.0	3871.1	4722.8	4867.7
Private investment in education	$1 \le \tau \le \tau_m$	250.2	305.9	342.5	366.9	482.5	674.4	877.3	1098.0	1335.0	2436.6
Private investment in culture and leisure	$1 \le \tau \le \tau_m$	423.2	936.2	1249.7	2479.8	3276.2	4601.2	6015.9	7561.1	9224.6	11565.5
Total		**1085.6**	**1896.1**	**2467.9**	**4116.3**	**5436.0**	**7631.3**	**9973.1**	**12530.1**	**15282.4**	**18869.7**

Continuation of Table 1

Indicator	Time frame, year	Year, mln. rub.								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
Expenditures of the UR consolidated budget and territorial state extra-budgetary funds										
Budget investments in health and sport		**11966.7**	**15018.0**	**21482.0**	**23095.2**	**23801.1**	**26477.7**	**27383.1**	**21195.2**	**24996.2**
Health care	$1 \le \tau \le \tau_m$	10500.7	13915.3	20234.3	21418.6	22390.7	25107.9	25418.6	19362.0	23224.9
Sport and physical education	$3 \le \tau \le \tau_m$	680.9	1102.7	1247.7	1676.6	1410.4	1369.8	1964.5	1833.2	1741.3
Budget investment in education		**13419.9**	**15300.3**	**19718.0**	**24802.1**	**26549.2**	**26349.0**	**26914.0**	**26469.3**	**31207.0**
Preschool education	$3 \le \tau \le 6$	3306.2	3909.7	5201.5	7654.5	8454.7	7900.5	7518.0	7373.2	9596.1
General education	$7 \le \tau \le 17$	7152.0	8720.9	10841.2	12837.3	14041.4	14471.7	14920.4	13323.1	14867.6
Elementary vocational education (since 2017 – additional education for children)	$14 \le \tau \le 17$	666.6	641.5	703.1	696.5	–	–	–	1673.3	2003.3
Intermediate vocational education	$18 \le \tau \le 21$	455.0	564.4	1131.9	1218.7	1874.3	1820.1	1958.5	1908.9	2261.7
Retraining and developing skills	$25 \le \tau \le 59$	55.2	51.7	78.5	80.0	83.5	84.9	82.8	82.2	89.9
Higher professional education	$18 \le \tau \le 22$	–	–	–	–	–	–	–	–	–
Youth policy	$3 \le \tau \le 59$	516.2	537.6	323.3	330.0	338.9	268.0	634.3	588.4	729.8
Other issues in education	$3 \le \tau \le \tau_m$	1271.3	867.4	1438.5	1985.2	1756.4	1803.8	1800.0	1520.2	1658.6
Other expenses in health care and sport	$1 \le \tau \le \tau_m$	785.1	–	–	–	–	–	–	–	–
Budget investment in culture		**1916.9**	**2211.4**	**2460.3**	**2768.9**	**3679.7**	**3634.4**	**3666.0**	**3868.5**	**4623.0**
Culture	$3 \le \tau \le \tau_m$	1642.3	1861.2	2039.2	2230.4	3084.7	2965.5	2904.2	3043.8	3444.7
Cinema	$3 \le \tau \le \tau_m$	107.9	143.2	201.4	354.7	407.4	443.0	487.1	565.2	905.7
Broadcast media	$3 \le \tau \le \tau_m$	83.6	95.6	104.5	83.0	80.5	84.5	105.5	96.8	80.3
Periodicals and publishing houses	$7 \le \tau \le \tau_m$	78.9	106.7	111.5	96.0	104.3	120.5	143.,8	145.6	175.9
Other expenses in culture and mass media	$3 \le \tau \le \tau_m$	4.2	4.7	3.7	4.8	2.8	20.9	25.4	17.1	16.4
Total		**27303.5**	**32529.7**	**43660.3**	**50666.2**	**54030.0**	**56461.1**	**57963.1**	**51533.0**	**60826.2**
Expenditures from the Federal budget of the Russian Federation and state extra-budgetary funds in UR										
Budget investment in health care and sport	$1 \le \tau \le \tau_m$	*	*	*	*	*	987,3	1150,1	960,4	1065,1
Budget investment in education	$1 \le \tau \le \tau_m$	*	*	*	*	*	505.3	618.1	888.1	1440.7
Budget investment in culture	$1 \le \tau \le \tau_m$	*	*	*	*	*	10.2	13.4	44.4	50.9
Total			*	*	*	*	**1502.8**	**1781.6**	**1892.9**	**2556.7**
Private investment of the UR population										
Private investment in health care and sport	$1 \le \tau \le \tau_m$	5996.2	7155.8	7822.7	9041.0	9629.1	9826.9	10726.4	11644.3	11952.0
Private investment in education	$1 \le \tau \le \tau_m$	2410.2	2455.7	2912.5	2434.5	2387.0	2680.2	2413.8	2339.7	2553.5
Private investment in culture and leisure	$1 \le \tau \le \tau_m$	12525.5	13996.6	16033.8	18089.3	17995.9	19091.4	19560.4	21168.9	24724.8
Total		**20931.9**	**23608.1**	**26769.0**	**29564.7**	**30011.9**	**31598.5**	**32700.7**	**35152.8**	**39230.4**

*no statistics available.

Sources:

[1] Consolidated budgets of the entities of the Russian Federation and budgets of territorial state extra-budgetary funds. Available at: http://www.roskazna.ru/ispolnenie-byudzhetov/konsolidirovannye-byudzhety-subektov/

[2] Execution of federal budget funds in the Udmurt Republic. Available at:http://udmurtia.roskazna.ru/ispolnenie-byudzhetov/federalnyy-byudzhet/godovoy-otchet-ob-ispolnenii-byudzheta/

[3] Household income, expenditure and consumption. Available at: https://www.gks.ru/compendium/document/13271

TTable 2. Dynamics of basic indicators of the main directions of the UR socio-economic development for 2000–2018

Indicator	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Gross regional product (in current prices), mln. rub.[1)]	53307.4	65551.4	78346.3	89034.5	100833.1	139995.3	164848.5	205647.4	243135.5	230938.3
Per capita monetary income [2)] (in current prices), rub. per month	1478.4	1974.5	2466.7	3098.1	4657.0	6373.0	7798.1	7823.8	9586.6	11060.0
Production of goods and services per capita[3)] (in current prices), thsd. rub. per capita	33.5	41.4	49.8	56.9	64.7	90.3	106.9	133.9	158.9	151.3
Housing commissioning [4)], thsd. sq. m.	257	277	354	315	361	372	424	483	486	465
Number of registered crises[5)], thsd. items	30.1	30.5	24.5	33.0	37.0	54.2	65.3	53.0	44.9	38.8
National population growth[6)], people	-5596	-6174	-6774	-6589	-5756	-6816	-4531	-2060	-1015	882
Working-age mortality[6)], people	4498	5120	5456	5853	5859	5781	4912	4753	4553	3955
Minimum required monthly income (average per household)[7)], thsd. rub. per month	*	*	*	*	*	*	*	*	*	*
Index-deflator[8)] (to the previous year)	1.376	1.165	1.156	1.138	1.203	1.193	1.152	1.138	1.180	1.020

Continuation of Table 2

Indicator	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gross regional product (in current prices), mln. rub. [1)]	274578.1	335984.0	372782.7	405126.4	450548.9	517999.8	531855.8	556190.5	600000.0
Per capita monetary income[2)] (in current prices), rub. per month	12983.6	14452.3	16693.6	18660.3	21197.5	24454.5	23882.8	23925.4	24418.6
Production of goods and services per capita[3)] (in current prices), thsd. rub. per capita	180.3	221.1	245.6	267.0	296.9	341.4	350.6	367.1	398.0
Housing commissioning [4)], thsd. sq. m.	482.0	504.9	516.1	545.6	612.3	6485	650.1	658.6	717.1
Number of registered crises[5)], thsd. items	32.7	28.0	27.4	27.0	26.9	29.5	26.2	24.2	25.3
National population growth[6)], people	584	1547	3699	2806	2599	2630	1822	-258	-1656
Working-age mortality[6)], people	4063	3761	3455	3211	3176	2949	2878	2584	2412
Minimum required monthly income (average per household)[7)], thsd. rub. per month	*	45.018	*	57.704	60.644	65.113	67.518	67.991	*
Index-deflator[8)] (to the previous year)	1.142	1.159	1.091	1.054	1.075	1.076	1.032	1.054	1.103

* no statistics available.
Sources:
1) Gross regional product in the Udmurt Republic. Available at: https://udmstat.gks.ru/folder/51922
2) Standard of living in the Udmurt Republic. Available at: https://udmstat.gks.ru/folder/51930
3) Housing commissioning in the Udmurt Republic. Available at: http://www.minstroy.ru/taxonomy/term/480
4) Russia's regions. Main characteristics of the entities of the Russian Federation. Available at: https://www.gks.ru/folder/210/document/13205
5) Population of the Udmurt Republic. Available at: https://udmstat.gks.ru/folder/51924
6) Results of the Federal statistical observations on socio-demographic problems. Available at: https://www.gks.ru/free_doc/new_site/inspection/itog_inspect1.htm
7) Results of the Federal statistical observations on socio-demographic problems. Available at: https://www.gks.ru/free_doc/new_site/inspection/itog_inspect1.htm
8) National accounts. Available at: https://www.gks.ru/accounts

If it is known that the changes of i-th of the output function is within $[\varphi_i^{\min}, \varphi_i^{\max}]$, then normalized output data has the following form:

$$\bar{r}_{qi} = \frac{r_{qi} - \varphi_i^{\min}}{\varphi_i^{\max} - \varphi_i^{\min}},\ q = 1,...,n\ . \qquad (30)$$

To get the actual values of the output data, it is necessary to do the reverse conversion:

$$y_{qi} = \varphi_i^{min} + \bar{y}_{qi}\left(\varphi_i^{max} - \varphi_i^{min}\right),\ q = 1,...,n, \quad (31)$$

where y_{qi} – real function value; $\bar{y}_{qi}$ – i-th output normalized value of the function when the network input is the q-th image.

The quality of network training is determined by the training error using the formula:

$$\tilde{E}(\bar{W}) = 100\sqrt{\frac{2}{l \cdot n}\sum_{q=1}^{n} E_q(\bar{W})}. \qquad (32)$$

The calculation error is determined by the formula:

$$\tilde{\varepsilon} = \frac{1}{M_y}\sum_{y\in[2000,2018]}\frac{|y^* - y|}{y}, \qquad (33)$$

where M_y – the number of specified indicator points y on the time axis; y^* – values obtained from the pattern; y – real statistic data.

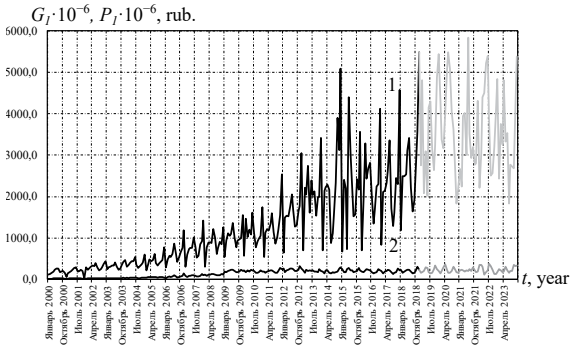
Results of neural network forecasting of human capital

We will perform human capital calculations on the example of one of the regions of the Russian Federation – the socio-economic system of the Udmurt Republic (UR). In the constructed neural network pattern for our example, the number of input neurons N=16 $(1, \{S_i\}_{i=1}^{n=3}, \{P_i\}_{i=1}^{n=3}, \{I_i\}_{i=1}^{n=8}, K)$, the number of hidden layers is equal to two (see *Figure 7*). Statistics on these indicators for UR are presented in *Tables 1, 2.*

Table 1 shows the annual budget and private investments aimed at the UR human capital development for the period 2000–2018 according to the Russian Federal Treasury, and the Territorial Office of the Federal Treasury for the Udmurt Republic and the Federal State Statistics Service of the Russian Federation.

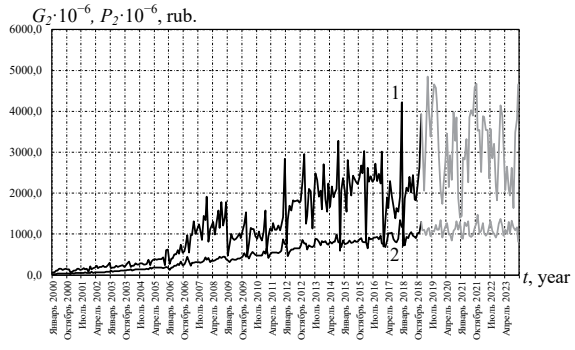
The dynamics of indicators of the UR socio-economic development according to the data of the Federal State Statistics Service, the Territorial State Statistics Service of the UR, as well as the Federal Statistical Observations on socio-demographic problems are shown in *Table 2.*

Figure 8. Investment dynamics in the UR education in 2000–2018 and their forecast in 2019–2023: budget (1), private (2)



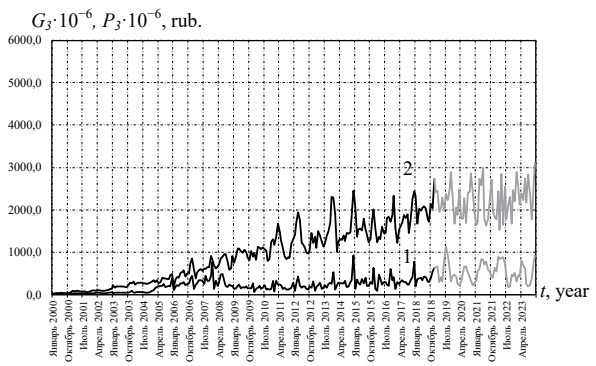
Source: own calculations.

Figure 9. Investment dynamics in the UR healthcare in 2000–2018 and their forecast in 2019–2023: budget (1), private (2)



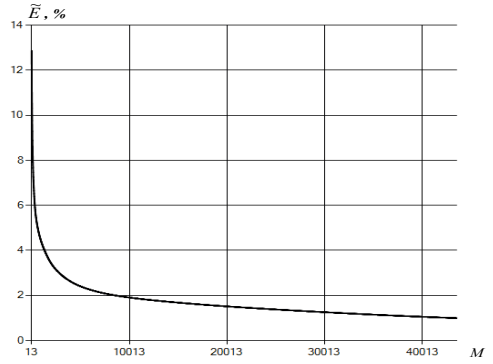
Source: own calculations.

Figure 10. Investment dynamics in the UR culture in 2000–2018 and their forecast in 2019–2023: budget (1), private (2)



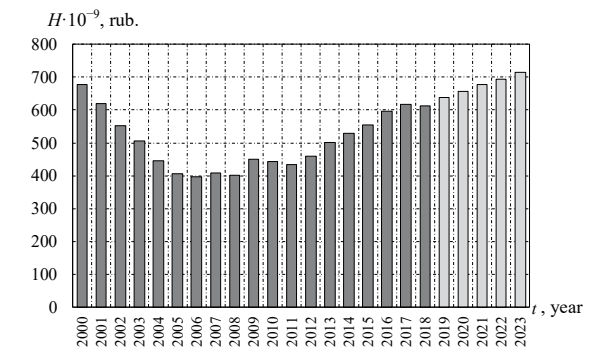
Source: own calculations.

Figure 11. Dependence of the neural network training quality indicator on the number of iterations

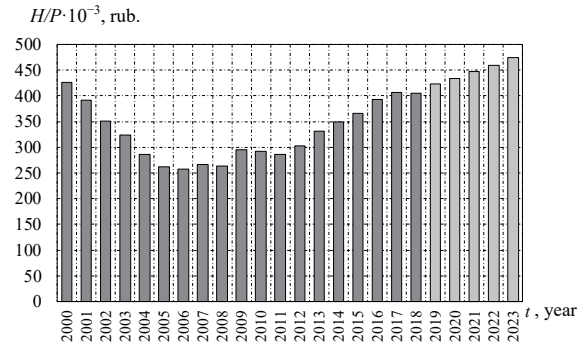


Source: own calculations.

Figure 12. Human capital dynamics (a) and specific value of UR human capital (b) for 2000–2018 and its forecast in comparable prices



a)



b)

Source: own calculations.

Figures 8–10 show the results of forecasting investments in the social sph*ere of UR for the period 2019–2023.* Figure 11 shows a graph of convergence to the 1% error level.

Deviation of pattern investment values from actual UR data for the period of 2000–2018 in health care is 1.4%, in education – 1.2%, in culture – 1.1%.

Based on the formula (10), the value of the HC UR for the period of 2000–2018 has been calculated. *Figure 12* shows the results of calculating the HC value for the period of 2000–2018 and the results of the problem solving of predicting the size and dynamics of the HC using the results of problem solving of predicting the volume of investments in the HC based on neural network modeling for the period of 2019–2023.

Conclusion

We have built a neural network algorithm, on the basis of which the forecasting human capital problem was solved on the example of

the socio-economic system of the Udmurt Republic.

Neural network modeling of predicted values of investment volumes in human capital has shown its effectiveness. Thus, the deviation of the pattern values of investments in the components of the HC UR from the actual data for the period 2000–2018 amounted to 1.4%.

Calculations showed that the human capital value of the Udmurt Republic decreased in the 2000–2006 interval, and then there was an increase in this indicator. The studied indicator has been showing the highest growth rates since 2013, and its further growth is predicted. In 2018, the human capital value per one UR resident amounted to about 400 thousand rubles.

The results obtained qualitatively correlate with the dynamics of changes in the human development index of Russia, determined by the UN experts which in the period from 2000 to 2012 increased from 0.71 to 0.79, and subsequently, until 2017, remained almost constant to a value of 0.80.

The Udmurt Republic is a Russia's typical region in many socio-economic indicators[2]. It is characterized by the average Russian values of these indicators. Therefore, the results and conclusions obtained during the research can be extrapolated to the RF as a whole.

The proposed methodology for calculating and forecasting the value, structure and dynamics of human capital can be used in assessing and comparing the socio-economic situation of the regions of the Russian Federation.

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Received January 22, 2020.

DOI: 10.15838/esc.2020.6.72.8
UDC 338.8, LBC 65.30

Problems of the State Industrial Policy Formation within Economic Digitalization*

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Abstract. Upcoming stage of the Russian economy formation is related to breakthrough toward new technologies that provide accelerated and advanced development of the country. In this situation, organizational and structural changes that meet the growth requirements of the economy and its foundation – industrial base – act as priorities of the socio-economic development. Newly emerging industrial policy, aimed at the deep structural modernization of the production sector of the Russian economy as the main object of this policy and digital transformation, is especially important in this context. The purpose of this work is to study problems of the formation of the industrial policy within scientific and technological changes and economic digitalization, as well as to substantiate areas of the state regulation concerning the industrial sector of the Russian Federation. We sum up theoretical and methodological basics of the industrial policy formation, review theoretical foundations of the industrialization essence and technological changes within economic digitalization, conduct the analysis of the state, trends, and problems of scientific and technological development of the Russian Federation's industrial sector, assess the readiness of the industrial sector to digital transformation, define priorities of the Russian Federation's industrial policy aimed at economic intensification and socio-economic development of the country. The scientific novelty of the study consists of the expansion of methodological approaches to ensuring the growth of the Russian economy and increasing its competitiveness within the new industrialization based on the formation of industrial policy in accordance with scientific and technological changes and economic digitalization.

Key words: industrial policy, new industrialization, digitalization of the economy, economic growth, state, trends, areas of development.

* The reported article is supported by the grant of the President of the Russian Federation (MK-3098.2019.6).
For citation: Uskov V.S. Problems of the state industrial policy formation within economic digitalization. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 134–151. DOI: 10.15838/esc.2020.6.72.8

Introduction

Socio-economic development in the Russian Federation, as in any state, is defined by the impact of many factors. Among them, there are so-called "great challenges"[1] that are dictated by external global circumstances, and they can be called a consequence of internal processes.

External factors include, fist of all, the introduction of western countries' sectoral sanctions in 2014, which impacted several areas of the Russian economy, the decline of global oil prices in 2015, which deepened the systematic economic crisis, and the slowdown of global economy growth rates in general.

Internal factors, which restrict the economic growth and the country's socio-economic development, include the dependence of national economy on energy exports. The mining and refining sector provides more than 60% of all export revenues and more than a third of the balanced financial result in the economy. The ratio of hydrocarbon exports to the GDP grows. In one year, it increased by 0.5 p.p.: from 12% in 2016 to 12.5% in 2017. As a result, the Russian economy stagnates[2]. In the 1999–2008 period, Russia's GDP had an average annual growth of 6.9%. However, the Russian economy has barely shown any increase in the last 10 years. The Ministry of Economic Development does not expect significant economic growth in the coming years, predicting a 1.3% increase of the GDP in 2019, 1.7% in 2020, and just over 3% in subsequent years. If the current trends continue, Russia will not be able to rise to the fifth position by 2024, i.e. to fulfill the task defined in May Presidential Decree no. 204, which is one of the main targets for the upcoming political cycle. A negative impact is provided by a low level of productivity, a critical deterioration of the equipment (according to Rosstat, the "leaders" according to depreciation of fixed assets are industry, healthcare, transport, and communication areas; in these industries, depreciation of fixed assets exceeds 50%), low share of high-tech, knowledge-intensive industries, which are able to generate value added (less than 9% of Russian organizations carry out innovative activities; technological innovations – only 9.5% of organizations; R&D and technological innovations costs are extremely small). In such conditions, it is difficult to ensure the growth of production and labor productivity, the competitiveness of products and the economy as a whole. All of this makes Russia's further underdevelopment in terms of promising technologies, in comparison with advanced countries, real.

Thus, the export-raw material model of the Russian economy has exhausted itself, and it should give way to the neo-industrial model, which can form a priority need for the active introduction of innovative mechanisms of the economic growth and the development of breakthrough scientific and technological areas of economic development. It is possible to achieve this by purposeful development of material production, increasing the part of the industrial component and stimulating the high-tech manufacturing industry. At the same time, the most important tool for the transition to the neo-industrial development model is a scientifically based industrial policy aimed at modernizing the industry and mastering the production of high-tech science-intensive products.

The purpose of our work is to study the problems of the industrial policy formation in the context of scientific and technological

[1] "Great challenges" are a set of problems and opportunities, the response to which is recognized by society and the government as the main development task for a given period of time.

[2] Dependence of the Russian economy and budget on oil. Available at: http:// stolypin.institute/wp-content/uploads/2018/02/issledovanie-syrevaya-zavisimost-2018.01.30-2.pdf

changes and digitalization of the economy, including the justification of the areas of state regulation of the industrial sector of the Russian Federation.

The following objectives are aimed at achieving this purpose:

1) to summarize the theoretical and methodological foundations of the industrial policy formation;

2) to study the theoretical foundations of the industrialization's essence and technological changes within economic digitalization;

3) to analyze the state, trends, and problems of scientific and technological development of the industrial sector of the Russian Federation;

4) to assess the readiness for the industrial sector development of a region within economic digitalization;

5) to determine the areas of the government regulation in the industrial sector of the Russian Federation within scientific and technological changes and digitalization of the economy.

Materials and research methods

The theoretical and methodological basis of the study consists of the works of domestic and foreign scientists-economists in the field of scientific, technological, and innovative development of the economy, public administration, formation and implementation of the industrial policy.

The research is based on the analysis of the Russian industrial sector in the context of economic development with an emphasis on digitalization and informatization of production as a technological platform for economic growth in the Russian Federation.

In addition, a questionnaire survey of heads of enterprises of the industrial sector of the Vologda Oblast was conducted, during which we obtained estimates of the level of scientific and technical development of the industrial sector of a region's economy, its readiness for the introduction of digital technologies in the context of the Fourth Industrial Revolution. The sample includes 50 respondents. The Vologda Oblast acts as an object of sociological research due to the fact that it is a typical entity of the Russian Federation with negative trends in the production sector, as well as in the level of its innovation and technological effectiveness, natural for industrially developed regions.

The usage of these methods allowed a more reasonable approach to proposals for adjusting the state industrial policy of the Russian Federation within scientific and technological changes and digitalization of the economy, as well as improving the mechanisms for its implementation.

The study contributes to the implementation of tasks set in the Presidential Order "On National Goals and Strategic Objectives of the Russian Federation through to 2024", namely: the creation of a highly efficient export-oriented sector in the basic sectors of the economy (manufacturing industry mainly), the development of the economy based on modern technologies, and its provision with highly qualified personnel.

Theoretical aspects of the research

Issues of the industrial policy in Russia are in the focus of not only state authorities and business but also scientific community and civil society institutions. This interest is largely caused by low growth rates of the Russian economy, which were the result of serious structural economic imbalances, which significantly complicated the consequences of the systemic crisis. A possible way to overcome the crisis is the new industrialization policy, which requires a combination of an active role of the government and market mechanisms in the implementation of industrial policy.

A critical analysis of the works of Russian scientists [1; 2] on the problems of industrial policy formation suggests that its content, forms, and methods are determined by many factors, the most important of which are the stage of society's development, the level of the

country's socio-economic development, the mentality of the population, the institutional environment, the economy's structural proportions, etc. Much depends on the system of public administration. In a planned economy, the role of a government in managing production processes is very significant. In market conditions, its role is mainly reduced to supporting the industry, creating conditions (regime) of the most favorable conditions for national producers of industrial products.

The concept of industrial policy began to form in the 19th century – in the industrialization era. The subject of the industrial policy was a government. Technical and technological means of the production sector were considered main tools for solving the most important socio-political problems.

In developed countries, industrial policy formed in the 19th century, and it was interpreted as a policy to support certain important economic sectors. In the USA, for example, it was called "industrial policy in the agricultural sector" or "industrial policy in the tourism business", etc.

Modern interpretations of industrial policy are somewhat different. According to O. Graham, it should be seen as official strategic actions declared by a government in order to stimulate the development of industries and change the structure of industry [3]. Another researcher suggests that industrial policy should be understood as a government policy aimed at supporting certain specific types of activities and contributing to structural changes[3].

The Russian Federation has developed a specific understanding of industrial policy. This concept was initially introduced in 1993 in relation to the adoption of the industrial policy concept in the military-industrial complex. Unlike "industrial policy", it was interpreted as "government policy in the field of industry", "government support for industry", "industrial development policy", etc. This understanding of industrial policy also has good reasons, because industry is a system-forming sector of the domestic economy.

We emphasize that, in Russia, the Federal Law on industrial policy was adopted only in 2014. After the default of 1998, regional state authorities formed their own concepts of the industrial development, taking into account the characteristics of specific territories, but there was no such document at the country level (*Tab. 1*).

This, of course, impacted the quality. According to Doctor of Sciences (Economics) O. A. Romanova, these documents were not based on general principles, did not have a common goal, did not agree with the federal priorities, and did not contain agreed mechanisms for the industrial policy implementation [4].

In the scientific community, there are various assessments of the stages of the RF industrial policy development. Generalization of scientific publications on this topic [4; 5; 6] allowed us to identify the following stages of the formation and development of industrial policy in Russia (*Tab. 2*).

Special attention should be paid to the post-2012 period, when leading Russian scientists and economists (S.Yu. Glaz'ev, S.S. Gubanov, E.B. Lenchuk, O.A. Romanova, A.I. Tatarkin, etc.) proclaimed the new industrialization as the main goal of Russia's industrial policy. In our opinion, this is justified. Only the creation of new sectors, innovative upgrade of traditional industries, creation of jobs for new and modernized sites, the formation of competitive structurally balanced economy will allow Russia to become a world leader and successfully solve the tasks of the country's socio-economic development.

[3] Rodrik D. *Industrial Policy for the Twenty-First Century.* Harvard University, 2004. Available at: http://www.hks.harvard.edu/fs/drodrik/Research%20papers/UNIDOSep.pdf

Table 1. Concepts of regional industrial policy of the Russian Federation after the default of 1998

Region	Essence of industrial policy
Republic of Yakutia	Focus on start-up capital, creation of a start-up investment fund based on concessions for the development of mineral deposits, attraction of foreign capital
Republic of Tatarstan	The strategy of growth points. Significant support for the real economic sector; in industry, primary attention was paid to the electric power industry, oil, chemical and petrochemical fields, and light industry
Vologda Oblast	Policy oriented toward the "Severstal" plant, revenues of which generated more than 80% of the regional budget. After 1996 – development of the investment legislation focused on the integrated development of the economy
Novgorod Oblast	Strategy for stimulating the development of the real sector of the economy. Creation of the conditions for investment in the real economy without identifying priority areas
Yamalo-Nenets AO, Krasnoyarsk Krai	Orientation strategy toward the external (regional) monopoly – "Gazprom" («Krasnoyarsk aluminium plant")
Samara, Nizhny Novgorod, Sakhalin, Kamchatka oblasts, Krasnodar and Primorsky krais, Republic of Adygea	Strategy of single-industry development (for regions with developed ferrous, non-ferrous metallurgy, mechanical engineering)
Source: Tatevosyan G.M., Sedova S.V., Pisareva O.M., Toreev V.B. *Coordination of the Federal Center's Policy and Entities of the Federation*. Moscow: CEMI RAS, 2006. 55 p.; Egorov E.G. *Main Provisions of the Regional Economy's Modernization Concept. "Yakutia – 21st Century"*. Yakutsk, 1996. 33 p.; Tatarkin A.I., Romanova O.A. Industrial policy: genesis, regional features and legislative support. *Economy of Region*, 2014, no. 2, pp. 9–21.	

Table 2. Stages of the industrial policy development in Russia

Period	Content of industrial policy	Results of implementation
1989–1991	Lack of industrial policy, because the market is seen as a panacea for all ills	Degradation of the technological and industrial structure of production
1992–1993	Selective support for priority industries	Lack of positive dynamics in the development of knowledge-intensive industries, search for rent due to special relations between business and the state
1994–1998	Support for commercially effective projects (4:1 financing principle)	Lack of positive structural changes, technological progress
1998– 2000	The best industrial policy is its absence	Preservation of the existing industrial structure
2001–2005	Soft (horizontal) industrial policy that implements universal methods of support within the framework of a liberal model of economic development	Some improvement of conditions for the development of low-tech industries, reduced competitiveness and destruction of the development potential of high-tech industries
2006–2008	Complementing a soft industrial policy with selective measures of state support for priority activities. Formation of the national industrial policy. Beginning of the transition to a competitive industrial policy	Increasing the innovation potential, focusing on the development of high-tech industries, implementing national projects
2009–2011	Stimulating domestic demand; equalizing competitive conditions for the extractive and processing industries. Anti-crisis modernization and economic diversification	Structural modernization of the domestic economy with the advanced development of high-tech industries, increasing the prestige of labor in the branches of material production
2012 – now	New industrialization	Creation of new economic sectors, innovative renewal of traditional industries, creation of high-productivity jobs at new and modernized facilities, formation of a competitive structurally balanced economy
Source: Romanova O.A. Conditions and factors of structural modernization of the regional industrial system. *Economy of Region*, 2011, no. 2, pp. 40–48; Smirnov E. Innovative vector of industrial policy of the European Union. *The World Economics*, 2007, no. 2, pp. 54–59; Tatevosyan G.M., Sedova S.V., Pisareva O.M., Toreev V.B. *Coordination of the Federal Center's Policy and Entities of the Federation*. Moscow: CEMI RAS, 2006. 55 p.		

It should be said that the founder of the new industrialization (neoindustrialization) theory in the Russian Federation is S.S. Gubanov, who considers neoindustrialization as "a historically natural process of the productive forces development, which unfolds after the completion of the first phase of industrialization – electrification. It represents the second industrialization phase, i.e. automation and computerization of the production apparatus"[4].

We would like to note that the theoretical basis of the new industrialization was formed according to several theoretical views.

Thus, the classic of the economic theory A. Smith considered industry a process of manufacturing machines that allow "one person to do the work of many" [7], which corresponds to the classical understanding of industry as a way of replacing labor-intensive production with machine-intensive [8].

It is quite common to understand industrialization as a predominant development of the manufacturing industry, which contributes to noticeable structural economic changes. Therefore, it is often considered being very close to the industrial revolution[5].

The scientific justification of the industrial development path of Russia was given by the Russian scientist D.I. Mendeleev on the basis of the generalization of foreign and domestic experience. Thus, he made a significant contribution to the formation of the economic theory of industrialization[6].

The need to industrialize the socialist economy emerged from the Marxist theory. In the works of K. Marx, there was the interdependence between the development level of "productive forces" – used technologies first of all – and production relations in the production process[7]. A great influence on the formation of scientific conceptual approaches to industrialization by Russian scientists was also exerted by the discussions that unfolded in the 1920s regarding the choice of areas for socio-economic transformations[8]. In general, for a long time, there was a dominating opinion in the Soviet economy that industrialization is the development of mostly heavy industry[9].

The second scientific platform for studying the new industrialization – the theory of industrial society – emerged under the influence of the Technological Revolution (TR) in the 1950s–1960s. As part of the issues of industrialization, scientists put forward a number of theories, principles, laws and justified the stages and prospects of industrial development[10]. Walt Rostow's theory of the economic growth stages[11], Raymond Aron's theory of a unified industrial society [9], John Galbraith's new industrial society [10], Daniel Bell's theory of a post-industrial society [11], and others [12–14] played a fundamental role in the development of the theoretical framework within this scientific platform. Information is recognized as the most important resource of a post-industrial society [15–17]. In recent decades, this has been facilitated by a rapid spread of computer technologies and the Internet [18]. The fundamental characteristics of the new economy are the technological shift and structural transformations [8].

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[4] Gubanov S.S. New industrialization in the definition of the professor. *Internet portal of "The Economist" journal.* Available at: http://www.economist.com.ru/neoindustrial.htm

[5] Brodel F. *Material Civilization, Economy, and Capitalism, 15–18th Century*. Moscow, 1992. Vol. 3. P. 607.

[6] Mendeleev D.I. *To the Knowledge of Russia*. Moscow, 2002. Pp. 385–386, 430.

[7] Marx K., Engels F. *Selected Works.* 2nd edition. Vol. 4. 447 p.

[8] Erlich A. *The Soviet Industrialization Debate, 1927–1928.* Moscow, 2010.

[9] *The Great Soviet Encyclopedia.* 2nd edition. Vol. 40. P. 168.

[10] *The Social Science Encyclopedia. 1985. P. 386; The Encyclopedia of Sociology.* New and Updated. 1981. Pp. 135–136.

[11] Rostow W. *The Stages of Economic Growth: A Non-Communist Manifesto*. Cambridge University Press, 1960. 173 p.

In the modern information space, quite a lot is said about the formation of a "post-industrial society". Supporters of liberal views, regarding the prospects for the development of society and the economy, actively support the this direction of Russia's development.

However, first, material production continues to play an important role in the information economy, although it cannot be denied that its share in the GDP decreases. The production of material goods is still the only basis for satisfying the primary needs of a human and physical existence of society.

Second, in modern economic science and economic practice, there is a common opinion that material production loses its prevailing position in social reproduction (according to Marxist theory), the first position today is occupied by the service sector. However, this is primarily caused by accepted methodology for measuring these areas, which affects our perception of these proportions. The modern system of national accounting is based on a different methodological approach, highlighting the types of economic activity on the basis of the division of the economy into three sectors proposed by the English economist Colin Clark in the book "Conditions of Economic Progress" (1940): primary – agriculture and mining; secondary – manufacturing; tertiary – services[12].

Three, without a modern developed industry, including machine tools, electronics, and other high-tech industries, it is almost impossible to meet globalization challenges.

Four, many leading scientists speak about the importance of industry in the modern global economy. For example, G.B. Kleiner notes that "in the economy of many countries, industry acts as a "flywheel", the rotation of which ensures the stability of the functioning of the country's economy as a whole" [19]. A.A. Porokhovsky, considering the role of manufacturing in the economy of industrialized countries (primarily the USA), said: "Manufacturing remains the foundation of the economic independence of any country, and it determines the level of its competitiveness in the world" [20]. Norwegian economist Erik S. Reinert argued that the growth of the economy, the wealth of the country and its inhabitants directly depend on the development of the national economy of the manufacturing industry and "advanced" (high-tech) services, which are characterized by increasing returns [21].

Thus, the review of studies allows us to conclude that the industrial sector plays a very significant role in the economy and determines its growth rate, competitiveness and independence of the country. In this regard, in the context of the transition to the fourth industrial revolution, the formation of a national industrial policy is considered a measure aimed at a gradual change of the industrial production structure in accordance with selected national goals and priorities, which is an extremely relevant task. A strategically important priority of such policy of the Russian Federation should be the new industrialization aimed at creating new sectors based on the automation of production and the common usage of digitalization of processes and the modernization of existing production on an innovative basis.

Main research results

The theme of the rise of material production and manufacturing in its structure is important for the Russian economy. It is particularly important for the industrial entities of the NWFD, primarily the Vologda region. As a result of the "shock therapy" of the 1990s and free trade, the manufacturing industry of the region, as well as the country as a whole, was nearly destroyed. Large-scale privatization led to the destruction of production and

[12] Popov A.I. *Economic Theory: Book for Universities.* 4th edition. Saint Petersburg: Piter. 2006. P. 174.

technological cooperation ties, which resulted in a drop in the volume and efficiency of production and investments. As a result, Russia's GDP reached its 1990 level only in 2005. Price liberalization, on the one hand, made it possible to overcome the commodity deficit, and on the other – caused an increase in inflation, which destroyed economic mechanisms, devalued the working capital of enterprises[13].

The greatest decline in industrial production was observed in the mid-1990s and 2009. It is clearly visible in the dynamics of the industrial production index of the Russian Federation and the Vologda Oblast (*Fig. 1; Tab. 3*).

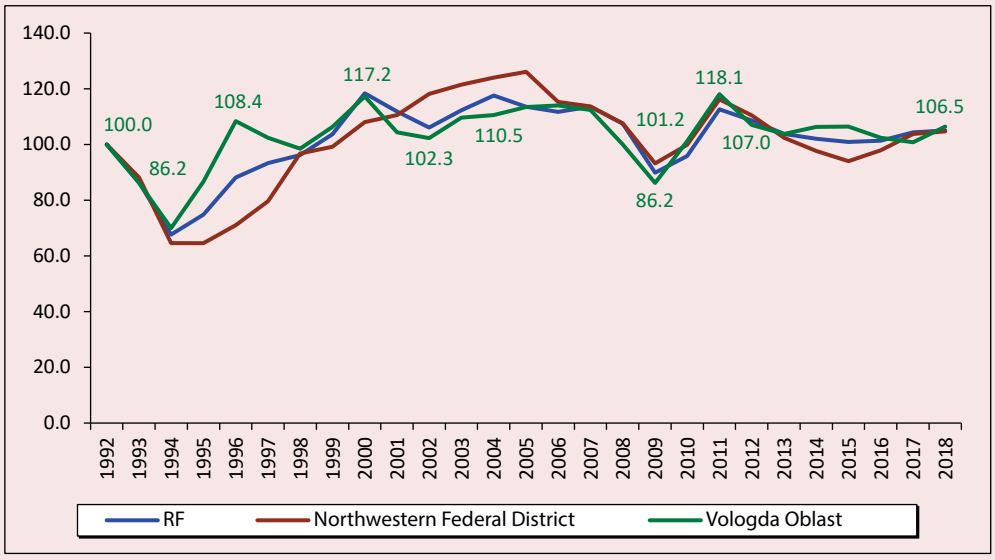
In general, during the studied period, the industrial production index slightly exceeded the 1992 level. At the same time, in industries such as ferrous metallurgy, mechanical engineering and metalworking, and the forest

Table 3. Indices of industrial production of the Vologda oblast by type of economic activity, 1990 – 100%

	1992		2000		2005		2010		2016	
	Vologda Obl.	RF	Vologda Obl.	RF	Vologda Obl.	RF	Vologda Obl.	RF	Vologda Obl.	RF
Ferrous metallurgy	90.0	82.3	80.9	66.8	112.4	87.5	118.6	92.2	95.4	95.0
Chemical industry	72.0	79.0	111.5	69.7	117.1	81.9	114.8	91.2	116.7	122.8
Mechanical engineering and metalworking	95.5	84.4	109.3	32.3	150.6	44.9	150.5	48.7	107.4	45.7
Electroenergetics	–	79.8	414.8	45.2	325.4	116.1	132.0	111.5	106.4	119.2
Forestry, woodworking	102.0	78.7	73.3	37.4	129.7	48.5	117.3	47.3	109.8	50.9
Food industry	78.0	80.0	65.5	54.6	116.5	75.2	117.5	91.4	105.5	106.4

Source: *Russia in Figures. 2018: Stat. Coll.* Rosstat. Moscow, 2018. 522 p.; *Statistical Yearbook of the Vologda Oblast.* 2017: Stat. Coll. Vologdastat. Vologda, 2018. 389 p.; *Industry in the Vologda Oblast. Results for 1990–1999: Analitical Collection.* Vologda, 2001. 44 p.

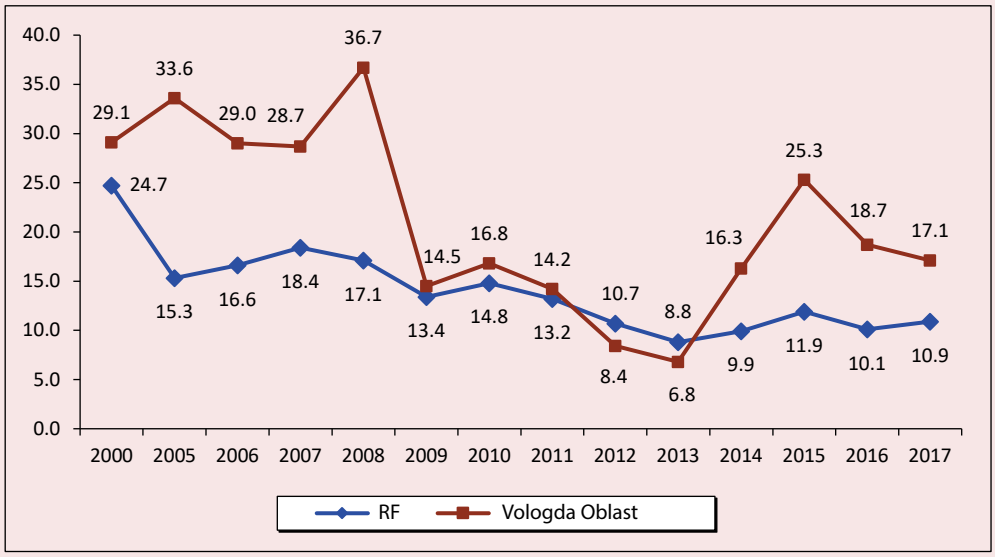
Figure 1. Industrial production index, 1992 – 100%



Source: Industrial production. Available at: https://www.gks.ru/enterprise_industrial

[13] *Analyzing the Past, Thinking about the Future: Monograph*. Under the scientific supervision of Doct. of Sci. (Econ.), Professor V.A.Ilyin. Vologda: ISEDT RAS, 2015. 336 p.

Figure 2. Profitability of production of industrial enterprises of the Russian Federation and the Vologda Oblast in 2000–2017, %



Source: Rosstat data.

industry, the industrial production index has significantly decreased, and it currently does not exceed the 1990 level.

However, the profitability of industrial enterprises' products significantly decreased – by more than two times in the period from 2000 to 2017 (*Fig. 2*).

The decline of industrial production led to changes in the structure of the economy (*Tab. 4*). In the Vologda Oblast, trade and repair services developed at a faster pace than other economic activities. Despite the fact that the share of manufacturing industries in the GVA of the region exceeds 30%, it significantly decreased (from 46 to 38%) in the 2005–2017 period. In the Russian Federation, the share of manufacturing industries in the GVA also decreased during the studied period, it was 17% in 2017.

Over the years of reforms, the structure of the regional economy has significantly transformed. The share of high-tech industries has significantly decreased. Currently, the largest share in the structure of industry is occupied by ferrous metallurgy and chemical industry, whose enterprises are largely focused on the external market and export of products of lower production stages. A similar situation is recorded in the whole country – there is a primitivization of production.

At the same time, the dynamics of the industrial production index of the CIS and Baltic countries, which, like Russia, are experiencing a transformational period, allows us to conclude that their trajectories have clearly divided into two clusters for a quarter of a century. The three republics took the lead. Among them, Uzbekistan is the leader, which has achieved a 5 times growth compared to the 1990 level. The growth rates of the industry of Turkmenistan and Belarus are slightly lower. The remaining states are at or below the pre-reform level. The industrial sector of Russia grew slightly during the reform period, amounting to 105% compared to 1990[14] (*Fig. 3*).

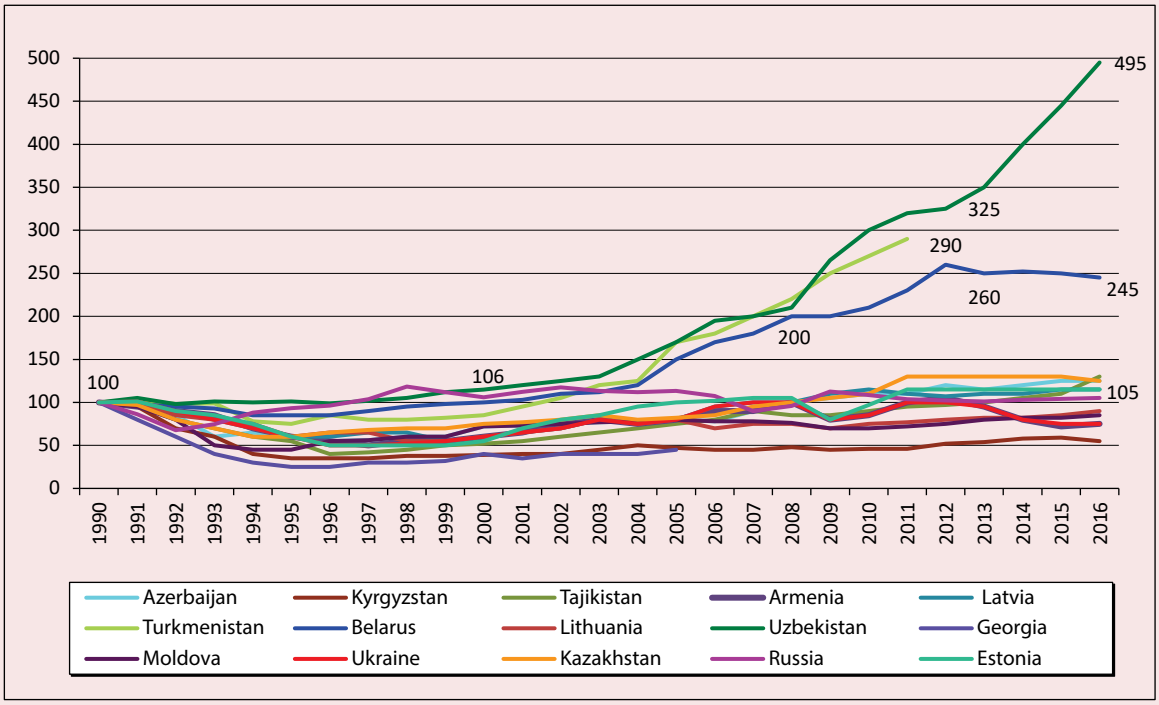
[14] Gundarov I. Sociohumanistic effect. Liberal and eurasian economic models – experience of a 25-year comparison. Available at: http://www.ng.ru/nauka/2019-11-12/11_7724_effect.html

Table 4. Structure of the economy of the Russian Federation and the Vologda Oblast by the share of economic activities in gross value added, %

	Vologda Oblast			Russian Federation		
	2005	2010	2017	2005	2010	2017
Agriculture, forestry, hunting, fishing, and fish farming	7.5	5.8	4.1	5.2	4.3	4.6
Mining operations	0.0	0.0	0.0	12.8	10.4	12.1
Manufacturing industries	46.6	38.1	38.1	18.5	17.7	17.4
Provision of electricity, gas, and steam; air conditioning	3.5	4.7	3.1	3.8	4.5	3.3
Construction	10.3	7.9	7.1	5.7	6.9	6.2
Wholesale and retail trade; repair of motor vehicles, and motorcycles	6.6	8.5	12.8	21.8	19.4	16.7
Transportation and storage	11.9	14.3	12.7	10.6	10.5	8.0
Activities of hotels and catering establishments	0.5	0.7	0.6	0.9	1.0	1.0
Financial and insurance activities	0.5	0.4	0.3	1.1	0.6	0.5
Real estate operations	3.9	5.1	2.9	9.0	11.4	6.5
Education	2.2	2.9	2.2	2.8	3.0	3.0
Activities in the field of health and social services	3.3	4.2	3.6	3.1	3.7	3.9
Other activities*	3.2	7.4	12.5	3.2	7.4	12.5

* Other activities include: information and communication activities; professional, scientific, and technical activities; administrative activities and related additional services; public administration and military security; social security; activities in the field of culture, sports, leisure, and entertainment; activities of households as employers; undifferentiated activities of private households for the production of goods and services for their own consumption.
Source: Rosstat data.

Figure 3. Dynamics of the industrial production index in the CIS and Baltic countries, 1990 – 100 %



Source: Gundarov I. Sociohumanistic effect. Liberal and eurasian economic models – experience of a 25-year comparison. Available at: http://www.ng.ru/nauka/2019-11-12/11_7724_effect.html

One of the possible ways to solve these problems, as well as a way of responding to the challenges, is seen in the new industrialization of the Russian economy. However, a serious obstacle to the development of industry and high-tech industries, based on information technologies, is the low share of domestic expenditures on information and communication technologies in the gross domestic product of the country.

The analysis shows that, in the period from 2010 to 2017, this indicator did not change significantly (1.1% of GDP), while the costs of organizations for information and communication technologies constantly increased. The growth rate of these costs corresponded to the GDP growth rate (*Tab. 5*).

In developed economies, the main motivation for the deployment of new industrial and technological policies was the need to overcome the slowdown in labor productivity growth. This problem is also relevant for the Russian Federation. Over the 2003–2016 period, labor productivity in Russia practically did not increase (*Tab. 6*); in half of the industries presented in the table, it decreased in 2016 in comparison with 2003. Therefore, for the full realization of the potential of the national economy of Russia, the task of ensuring sustainable growth in the level of labor productivity has not lost its relevance.

Technological modernization of production facilities is seen as one of the main reserves of its solution, based on the commissioning of new equipment, modernization of existing equipment, introduction of integrated automation, etc. The absolute majority of the surveyed managers of Russian industrial enterprises (84%) consider an increase in the technical level of production to be a key internal condition for increasing labor productivity[15]. However,

Table 5. Information and communication technology expenditures in GDP for the period from 2010 to 2017

Indicato	2010	2012	2014	2015	2016	2017	2010–2017, %
Cost of ICT, bil. rub.	516	843	1175	1153	1249	1012	196.1
GDP, bil. rub.	46309	68164	79199	83387	86010	92000	198.7
Cost of ICT in GDP, %	1.11	1.24	1.48	1.38	1.45	1.10	-0.01
Source: *Regions of Russia. Socio-Economic Indicators. 2003–2018*. Available at: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/ publications /catalog/doc_1138623506156							

Table 6. Labor productivity index for the main sectors of the economy of Russia, 2003–2016, 2003 – 100%

Branch of the economy	2003	2010	2012	2014	2016
In general in the economy	100.0	103.2	106.6	104.0	100.5
Agriculture, hunting, and forestry	100.0	88.3	88.5	103.5	107.3
Fishing, fish farming	100.0	97.0	106.1	105.1	92.5
Mining operations	100.0	104.3	104.6	103.1	101.1
Manufacturing industries	100.0	105.2	110.2	107.4	103.3
Production and distribution of electricity, gas, and water	100.0	103.0	103.2	100.4	102.3
Construction	100.0	99.6	101.0	99.8	94.9
Wholesale and retail trade, repair of motor vehicles, motorcycles, household products	100.0	103.6	105.8	100.8	95.6
Hotels and restaurants	100.0	101.7	103.6	101.7	95.0
Transport and communications	100.0	103.2	105.5	102.6	100.2
Real estate transactions, leases	100.0	104.0	104.8	99.4	98.9
Source: Efficiency of the Russian economy. *Federal State Statistics Service*. Available at: http://old.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/efficiency/# (accessed: December 17, 2019).					

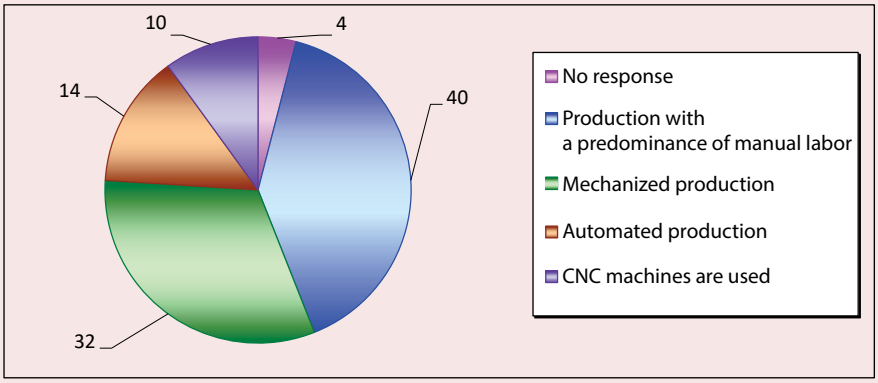
[15] Labor productivity. Results of a survey of 500 managers of industrial enterprises. Ministry of Industry and Trade of Russia, The Center for Strategic Research, Monitoring Centre of the industry development, Technological Development Agency, 2017.

the readiness of enterprises for modernization of industrial productions and development of digital technologies may be judged by the results of a survey of heads of leading industrial enterprises, conducted by the Vologda Research Center of RAS[16].

In the Vologda Oblast, only 14% of managers, who participated in the survey, noted that their company's production is automated. There are machines with numerical control at every tenth enterprise. A third of respondents (32%) indicated that their company's production is fully mechanized. However, manual labor production dominates in the majority of enterprises in the region: 40% of the survey participants answered this way (*Fig. 4*).

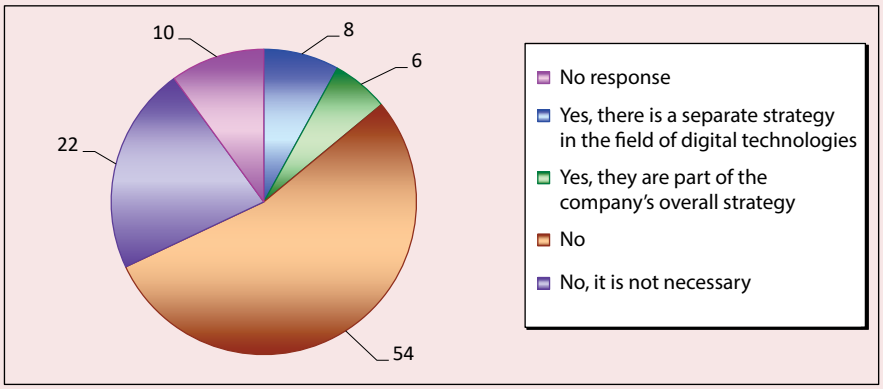
The majority of industrial enterprises in the region (54%) do not have a strategy for the development and implementation of digital technologies (*Fig. 5*), while 22% of respondents do not see the need for them.

Figure 4. Distribution of answers to the question "How can You characterize Your production according to the proposed list of criteria?", % of respondents



Source: survey data on the readiness of enterprises of the Vologda Oblast for the development of industry based on digital technologies, VolRC RAS, 2018.

Figure 5. Distribution of answers to the question "Does Your company have documents in the field of development and implementation of digital technologies?", % of respondents



Source: survey data on the readiness of enterprises of the Vologda Oblast for the development of industry based on digital technologies, VolRC RAS, 2018.

[16] The sample includes 50 industrial enterprises of the Vologda Oblast. The sampling error does not exceed 5%.

The monitoring showed that 54% of enterprises conduct training and professional development of employees in order to use digital technologies more often. 46% of respondents noted that they study the best practices of other organizations. At the same time, nearly 26% of respondents do not plan to use digital technologies (*Tab. 7*).

More than half of the survey participants (54%) pointed out that one of the barriers that complicate the process of using digital technologies is a high cost of projects. About 40% of respondents spoke about insufficient qualification of personnel, 26% drew attention to the lack of sufficient own experience in the use of digital technologies (*Tab. 8*).

Table 7. Distribution of answers to the question " What steps does Your organization take or plan to take to start using digital technologies for business more actively?", % of respondents

Respond option	%
Training and professional development of current employees	54.0
Study of the best practices of other businesses	46.0
We do not plan to use digital technologies in the near future	26.0
Cooperation with external experts and consultants	8.0
Hiring new employees with experience in implementing or using digital technologies	6.0
Purchase of ready-made assets (companies) with competencies in the field of digitalization	4.0
Raising capital to launch production digitalization projects	4.0
Creation of alliances with other companies to explore the possibilities of digital technologies	0.0
Establishment of working groups and participation in external working groups to promote digital initiatives	0.0
Other	2.0
Source: survey data on the readiness of enterprises of the Vologda Oblast for the development of industry based on digital technologies, VoIRC RAS, 2018.	

Table 8. Distribution of answers to the question "What are the most serious barriers that complicate or slow down the process of widespread use of digital technologies in Your company?", % of respondents

Respond option	%
High cost of digital technology projects	54.0
Lack of qualifications of the staff that use digital technology	40.0
Lack of sufficient own experience in the use of digital technologies	26.0
Lack of digital solutions that take into account the specifics of the company's business	20.0
Insufficient level of infrastructure development	14.0
Economic uncertainty in the country	12.0
Lack of awareness of the benefits of digital technologies among decision makers in a company	12.0
High operating costs for systems that use digital technologies	8.0
Lack of information about the successful experience of using digital technologies in other companies of an industry	6.0
Lack of qualification of personnel implementing and maintaining digital technologies	6.0
Introduction of digital technologies requires changes and costs on the part of suppliers and consumers	6.0
Lack of special measures of state support for the usage of digital technologies by companies	4.0
Unwillingness of employees to change the usual forms of work	2.0
Insufficient budgets allocated for projects using digital technologies	0.0
End-user's commitment to familiar products (services)	0.0
Regulatory restrictions, lack of standards for the usage of digital technologies by companies	0.0
Weak protection of digital technologies from criminal attacks	0.0
Negative experience of using digital technologies in a company	0.0
Negative experience of using digital technologies in other companies in an industry	0.0
Other	0.0
Source: survey data on the readiness of enterprises of the Vologda Oblast for the development of industry based on digital technologies. VoIRC RAS, 2018.	

Thus, the vast majority of industrial enterprises in the region do not have plans for the development and implementation of digital technologies; a head of every fifth one does not see the need for them. Among the digital technologies used by enterprises of the real sector, the Internet of things technologies prevail. The wide spread of digital technologies is hindered by a high cost of projects, insufficient qualification of personnel, and lack of experience. The lack of financial resources is a key factor hindering the re-equipment of production facilities [22]. This conclusion can be extended to the industrial sector of the Russian economy as a whole, since nearly all regions of the Russian Federation have the same problems, they are characterized by the same trends. As a result, the competitiveness of most Russian industries remains low.

Propositions

Unfavorable geopolitical situation, increased competition on world markets, and extremely low growth rates of the Russian economy further actualize the issue of the need for the development of the Russian Federation within the framework of a global trend – new industrialization. The Russian economy needs a purposeful development of material production, the creation of a high-tech manufacturing industry, and an increase in its share in the structure of industry, in order to regain its former position as a highly developed country in scientific and technical terms.

In this regard, the ideas of the new industrialization are extremely important for the Russian Federation. The rise of the role of material production in the system of social reproduction, the development of manufacturing industries should be considered a huge advantage of Russia and its individual regions. Accordingly, the task is to develop methods and mechanisms for the flow of resources from the excessively developed sphere of commodity circulation (in the Vologda Oblast, its share reaches more than 50% of the organizations' turnover) to the sphere of production of goods and provision of intangible services.

The formation of a new development model, which includes the structural restructuring of the economy, the revival of the real sector on the basis of the most advanced technological innovations are in the agenda. In the context of the unfolding new industrial revolution, the structural and technological factor comes to the fore, acting as the basis for the future material structure of the economy capable of generating new sources of growth, ensuring a high level of product competitiveness. This is possible only with a large-scale technological modernization of the domestic industrial complex [23].

While developing the potential of global technological leadership, developed countries focused on the following aspects. First, determination of national priorities for scientific and technological development and development of individual economic sectors within the framework of state scientific and technical, innovation and industrial policy; mutual coordination of long-term forecasts, strategies, plans, and programs in the economy's priority sectors. Second, formation of appropriate institutions and mechanisms that contribute to the implementation of goals and objectives to achieve technological leadership in priority areas. Third, acceleration of the participation of national corporations in global value chains. Four, increase of the competitiveness of the economy and its sustainable growth through selective support of scientific research and the introduction of technological progress.

Advanced foreign experience is also very useful for the Russian Federation. At the same time, its usage in Russian practice is impossible without the development and implementation of an adequate state industrial policy aimed at a significant contribution of the production

sector to the growth of the country's economy and the formation of its balanced structure. The lack of an adequate industrial policy threatens to further lag Russia in terms of labor productivity and product competitiveness in global markets, and it may become a systemic and insurmountable obstacle to development in the foreseeable future [24].

In the list of tasks of industrial policy, priority should be given to the following activities:

– promotion of technological re-equipment of the country's industrial enterprises;

– modernization of fixed assets;

– creation of conditions for the implementation of the results of intellectual activity in industrial production;

– expansion of the production of innovative products;

– development of the production and innovative potential of industrial enterprises.

In the context of scientific and technological changes and digitalization of the economy, industrial policy implies the implementation of a set of measures that meet the modern requirements of social development and national interests of the growth of innovative industries, sustainability, and socio-economic balance of the country:

– economic and non-economic support for scientific and technological development in all its facets;

– balanced structural policy of capital investments in the scientific and technological sphere, public investments based on the principles of public-private partnership contributed to the creation of an innovative economy in many countries of the world;

– strengthening of vertical and horizontal links and interactions of innovation participants, including cross-country cooperation, ensuring the completeness of the cycle from invention to R&D implementation;

– development of innovative infrastructure, including a network of channels for knowledge and technology transfer, exchange of experience, communication between researchers and entrepreneurs;

– formation of incentives for entrepreneurs engaged in innovation, aimed at coordinating local interests and system-wide guidelines of the country's movement (it is necessary to strengthen interest in innovation, streamline the regulatory framework, the system of income distribution and taxation, and reduce the tax burden on innovative businesses);

– integration of the interests of entrepreneurs, goals of the government, and the usage of foresight management mechanisms;

– institutional changes, including a system of clear and coordinated rules for innovation and scientific activities, relevant development funds and institutions, the creation of special bodies responsible for system strategic planning, coordination and scientific and technological policy;

– change of the economic growth model, creation of technological leadership scenarios, new models for managing the processes of scientific and technical changes and mechanisms for implementing technological development strategies.

Successful implementation of industrial policy, first, will be facilitated by the creation of a favorable regulatory environment, bringing it in line with the requirements of the digital economy as a new way of life and qualitatively new industrial relations. Second, it is necessary to provide appropriate information, material, and technical equipment for the implementation of new technologies and activities. Third, it is important to foresee changes in training courses, the system of training and retraining of personnel, and institutions for advanced training in new specialties. In addition, it is necessary to

develop suitable mechanisms aimed at supporting domestic companies that are most advanced in terms of new technologies.

An important role in the regulation of these processes should be given to the government. It needs to undertake development of a set of measures for the reindustrialization of industry, introduction of high-tech industries and innovatively active enterprises, ensuring an increase in the level of innovative potential [25; 26], structural transformation of the national economy, strengthening of the competitiveness level of industries and the economy as a whole, and on this basis – the socio-economic development of all territories of the country[17]. It is the government that plays a leading role in determining the state scientific and technological policy, priorities in the investment sphere, financing of fundamental sciences and risk projects in order to transfer production to a new basis [27]. At the same time, it has a very wide range of methods for implementing scientific and technological policies aimed at solving the problems of neoindustrialization (*Tab. 9*).

Thus, for the implementation of industrial policy aimed at neoindustrialization, it is necessary to form a new management paradigm, which will become an adequate methodological basis for the innovative and technological development of the country's economy and its branches.

Conclusion

Russia faces the task of the new industrialization based on modern high-tech industries. To solve it, it is necessary to adjust the state industrial policy. Objectively, it is necessary to increase the role of the government as an active economic entity and economic institution. In the national economic system of Russia, it is necessary to strengthen the planning beginnings to ensure the integrity and sustainability of the system, and a fuller realization of the public interest to apply a comprehensive approach to strategic development in branch and territorial aspects.

A strong state, while realizing public interests, can create conditions for the growth of the manufacturing industry. The development of a high-tech manufacturing industry is an

Table 9. Methods of implementing the government scientific and technological policy in the neo-industrialization conditions

No.	Direct methods	Indirect methods
1.	R&D financing from federal and regional budgets	Tax credits and benefits
2.	Control of ongoing purchases of technologies and innovations abroad	Stimulation of enterprises through changes in pricing and customs policies
3.	Insurance of the risk existing in innovative activity	Accelerated depreciation
4.	Subsidizing scientific and technical developments	Formation of innovative scientific and technological centers on the basis of the country's leading universities
5.	Subsidized financing of individual innovative projects and allocation of funds for the creation of interaction platforms	Improvement of legislation in matters of patent law, intellectual property
6.	Partial provision of government guarantees to attract to projects funds of different types of investors: banks, investment companies, etc.	Creation of a legal mechanism for the purchase or entry into the capital of small innovative companies of large business
7.	Institute of special investment contracts	

Source: own compilation according to Lenchuk E.B.,Vlaskin G.A. Formation of the digital economy in Russia: problems, risks, prospects. *The Bulletin of the Institute of Economics of the Russian Academy of Sciences*, 2018, no. 5, p. 9.

[17] *New Technological Revolution: Challenges and Opportunities for Russia. Expert and Analytical Report.* Moscow, 2017. 136 p.

important factor of the economic growth, ensuring of the competitiveness of Russian products in the domestic and global markets, and improving population's living standards.

The relevance and acuteness of problems require the following study. In particular, it is necessary to develop and test methodological tools for the comprehensive assessment of the level of scientific and technological development of the manufacturing sector of the Russian Federation in the transition to the digital economy; to assess the effectiveness of regions' industrial policy in the conditions of scientific and technological change and digitalization of the economy; to develop a mechanism for implementing regional industrial policy aimed at regulating the processes of the economy's innovative development in accordance with the requirements of the Fourth Industrial Revolution and transition to the digital economy.

The results of the study may be useful for federal and regional government authorities for adjusting the state industrial policy, as well as for developing a set of measures to boost economic growth.

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Received May 29, 2020

DOI: 10.15838/esc.2020.6.72.9
UDC 336.7, LBC 65.26

Role of Financial Resources of the Economy's Banking Sector in Russian Regions' Socio-Economic Development*

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Abstract. Financial capacities of the banking sector become an important strategic resource during the deficit of financial resources for the implementation of administrative multi-level spatial strategies and solution of important issues related to the territorial systems' socio-economic development. The purpose of the study is to justify the key role of the economy's banking sector in the solution of the issue concerning the increase of the RF entities' fiscal capacity and to assess a volume of credit institutions' necessary financial resources. To achieve this goal, the following objectives were set: to study fiscal capacity and structure of the regional systems' government debt and the banking sector's contribution to its formation, to construct spatial regression models showing the dependence of the regions' socio-economic development level and their fiscal capacity on financial resources attracted by the banking sector, to define the volume of credit institutions' financial resources, attraction of which will solve the problem of the RF entities' budget deficit. We use the methods of statistical and regression analysis in this work. As a result, it was revealed that the banking sector's investments in government and municipal debt securities and lending of the RF entities contribute to the increase of fiscal capacity, form financial foundation for the implementation of socio-economic development strategies. Attraction of investments in enterprises' shares and securities, loans to financial and non-financial business and households lead to an increase of the territories' gross

* The article is prepared in accordance with the approved research plan of the Institute of Economics of the Ural Branch of the Russian Academy of Sciences for 2019–2021.

For citation: Naumov I.V. Role of financial resources of the economy's banking sector in Russian regions' socio-economic development. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 152–168. DOI: 10.15838/esc.2020.6.72.9

regional product. The results of this study may be useful for the government authorities of the RF entities while implementing the developed spatial socio-economic development strategies.

Key words: financial resources, banking sector, fiscal capacity, strategic planning, regression modelling.

Introduction

Banks and credit institutions perform one of the most important functions in the economic development: they provide the real economic sector with necessary financial resources for the modernization and diversification of production. Scientists S.Yu. Glaz'ev [1], A.G. Aganbegyan [2], O.S. Sukharev [3], L.L. Igonina [4], S. Chung, H. Singh, K. Lee [5], J. Bushee Brian [6], Yafeh Yishay, Yosha Oved [7], and others wrote about the key importance of the bank credit in the development of the real sector of the economy. The banking sector also plays an important role in attracting long-term financial resources to implement investment projects aimed at building transport, engineering, and energy infrastructure. In the context of an acute shortage of budgetary financial resources for solving socio-economic problems of territorial systems development at various administration levels, issues related to the search for additional financial sources for the implementation of strategic initiatives emerge more often. In February 2019, the Government of the Russian Federation approved the Spatial Development Strategy until 2025[1], aimed at reducing inter-regional socio-economic imbalances, developing promising economic sectors of specialization, and forming promising centers of the economic growth, mineral resources and agro-industrial centers. The presence of budget deficits in most regions calls into question a possibility of implementing the formed strategies. Analyzing the problems of budget balance, N.V. Zubarevich argued that the policy of equalizing the budget deficit of territories implemented by the state at the expense of subsidies and state loans is not efficient, especially in the conditions of the crisis state of the Russian economy [8]. In our opinion, investment attraction from the banking sector in debt securities of Russian regions and their municipalities, as well as bank loans, may be the best way to solve this problem. In this regard, the purpose of this study is to substantiate the key role of the banking sector in solving the problem of balancing regional budgets, including assessment of the volume of credit institutions' required financial resources. To achieve this goal, the following objectives were set: to theoretically overview works on the assessment of the role of the banking sector of economy in increasing the territories' fiscal capacity, to assess the fiscal capacity of regional systems, to study the structure of the government debt of regional systems and contribution of the banking sector's financial resources in its formation; to build a regression model of the dependence of the regions' fiscal capacity and their level of socio-economic development on financial resources, attracted by banks; to determine the amount of financial resources of credit institutions which will help to solve the problem of budget deficit in the RF entities.

Theoretical overview of works on the assessment of the role of banks in increasing territories' fiscal capacity

Theoretical overview of works on the problems of territories provision with the banking sector's financial resources allowed drawing several conclusions.

[1] Spatial Development Strategy until 2025: Order of the Government of the Russian Federation no. 207-p, dated February 13, 2019.

1. There are ***opposite opinions regarding the banking sector's role in providing territories with financial resources.*** A.V. Chernyavskii wrote about an important role of the banking sector in solving the problems of balanced regional budgets. He noted that this sector is the main source of deficiency payments of regional budgets: "In 2012 and 2013, bank loans amounted to 58.3% in the structure of the RF entities' government debt and government debt securities, purchased by financial institutions – to 13.7%" [9, p. 22]. Ya.V. Zharii and Yu.V. Krasnyanskaya in the work "Transformation of the investment activity of the Ukraine's banking system for implementing strategic projects" highlight the role of banks in the implementation territories' socio-economic development strategies, and their credit and deposit resources in particular [10]. According to E.N. Ryabinina and A.F. Savderova, "the banking sector is an important component of the territory's financial system. In the strategy of socio-economic development, it is assigned a key role in ensuring the balance and innovative development of the economy". Researchers argued that the "sustainable development of regions is impossible without an adequate amount of financial resources, and it is credit organizations that accumulate and mobilize monetary capital, turning them into the most important source of funds for economic entities" [11, p. 25]. S.Yu. Glaz'ev, V.V. Ivanter, V.L. Makarov, A.D. Nekipelov, A.I. Tatarkin, R.S. Grinberg, and other scientists note that "the main reason for a persistent lack of funds for development is the orientation of financial policy to the existing state budget opportunities, which do not allow us to simultaneously solve the problems of maintaining current socio-economic stability and structural and technological modernization. The solution of the latter problem is possible only through the development of bank credit" [12, p. 19]. According to Sh.D. Arslanov, the need to develop the banking sector in the region is caused by the fact that "this structure of the socio-economic system is an important mechanism for self-development and stabilization of an entire region. The banking sector of a region, ensuring the redistribution of funds, lending, and settlements, contributes to the growth of public labor productivity" [13, p. 8]. A.G. Aganbegyan [2], O.S. Suharev [3], A.I. Stolyarov [14], E.V. Popova [15], and several foreign scientists – A. Belke, U. Haskamp, R. Setzer [16], C. Bernini, P. Brighi [17], M. Gjelsvik [18], S.S. Jha [19], etc. – wrote about the key role of the banking sector in the socio-economic development of territorial systems at the macro-economic level.

At the same time, some authors speak about a negative impact of the banking sector and the regulation policy of the Central Bank of the Russian Federation on the socio-economic development and financial stability of territorial systems. In particular, criticizing the monetary policy implemented in Russia, O.S. Sukharev noted that "the presence of the financial sector with institutions, created for it, greatly reduces the GDP growth rate". The reason for this, in his opinion, is the implementation of this sector "financial and speculative activities that are beyond the control of a reasonable macroeconomic policy of the Government, and they contribute to the leaching of financial resources from the regions, ultimately leading to the increase of the regional budget deficit|" [20, p. 135]. V.A. Fedoseeva argued that "Russian regions with a more developed regional banking sector can absorb capital from neighboring regions. At the same time, the economic security of regions with an undeveloped sector of regional banks will always depend on decisions made outside their territories" [21, p. 57]. According to A.G. Aganbegyan, due to inefficiently

organized supervision of financial institutions in the regions and the policy of the Central Bank of the Russian Federation, "the banking system practically does not engage in credit investment of businesses or regions with municipalities" [22, p. 7]. A.I. Tatarkin noted that "the policy of the Central Bank of the Russian Federation to revoke licenses from commercial banks deprives the population, small- and medium-sized businesses of savings and funds for the development and innovative renewal of production" [23, p. 20]. He wrote that many subsidized regions do not have access to credit resources of the banking sector of the economy, and an inefficient financial policy is applied to them: instead of supporting territories with "state orders, bank credits, and investment programs to modernize their economy and switch to a model of sustainable self-development, annual subsidies are provided for them" [23, p. 15]. The negative impact of financial and speculative activities, carried out by the banking sector, on the regions' economic development was also noted in our early works. The study of the features of the formation and use of investment potential of banks showed that "available financial resources of this economic sector are used for speculative operations with foreign currency, shares, and debt securities of foreign issuers. Most financial resources of credit institutions are placed on foreign accounts in the form of deposits" [24]. In modern conditions of economic development, "the banking sector, unfortunately, no longer performs its traditional functions of accumulating, saving, and reproducing the monetary resources of the institutional economic sectors" [25]. And this is facilitated by the monetary policy of the Central Bank of the Russian Federation. To attract financial resources of the banking sector to various budgets in order to implement generated strategic ideas, it is necessary to restructure the financial policy of credit institutions along with, first of all, the state's monetary policy.

2. ***The second conclusion is that the banking sector's contribution to the development of territorial systems is limited in terms of financial instruments.*** Most researchers narrow the role of the banking sector down to lending infrastructure projects, implemented by government authorities at the regional and municipal levels, construction, and housing. The participation of the banking sector in the implementation of social policies of territorial systems – housing and consumer lending to households in particular – is also noted. At the same time, there is no assessment of the contribution of the banking sector to the formation of financial foundations of territorial systems using such an investment tool as investments in state institutions' debt securities, federal loan bonds, regional and municipal budgets. They are the most attractive for the public sector of the economy, because, unlike loans, they provide a repayment delay of the main part of the debt, especially when using debt securities with a long maturity. In the context of the need for long-term investments in the implementation of strategies for socio-economic development of territories, this investment tool of the banking sector of the economy becomes the most efficient mechanism for attracting financial resources. It should be noted that discussions on the role of the banking sector in the implementation of strategic programs for territorial development and a progressive socio-economic development of territorial systems in the scientific community have appeared relatively recently. The aspect of attracting financial resources of the banking sector to securities of the RF entities and their municipalities has not yet been thoroughly studied.

Methodological approach to the study of the role of the banking sector in increasing fiscal capacity and socio-economic development of regions

There are three main methodological approaches to the study of the provision of territorial systems with financial resources in the scientific literature: 1) statistical approach involves the comparison between the dynamics of indicators of the territory's socio-economic development and credit institutions' financial resources; 2) balance approach considers the system of movement of financial resources between institutional sectors in the territorial system in the form of an equilibrium model; 3) econometric modeling represents the dependence of territories' socio-economic development on resources, attracted by the banking sector, in the form of mathematical equations.

The first approach is the most common. It was used by N.V. Zubarevich [8], A.G. Aganbegyan [22], A.V. Chernyavskii [9], Ya.V. Zharii and Yu.V. Krasnyanskaya [10], E.N. Ryabinina, A.F. Savderova [11], Sh.D. Arslanov [13], and many others. Statistical analysis of indicators of the territories' financial development helps to establish trends and patterns in the dynamics of processes, but it does not allow proving the development dependence on financial resources, attracted by the banking sector, and forming the forecast concerning territorial systems' socio-economic development with changes of the volume of resources attracted by the banking sector.

This problem is also natural for the balance approach to the study of the territorial systems' provision with financial resources. The creation of financial flows' movement matrices between institutional sectors using the methodology of the System of National Accounts (SNA) and formation of a social accounting matrix (SAM) allows revealing interconnections between the financial corporations sector, which includes banks and other credit institutions, insurance companies, investment funds, and the sector of non-financial corporations, public administration, households, and foreign institutions. This approach, unlike others, allows thorough demonstration of all processes of financial resources' movement between these sectors by various instruments (investments in monetary gold, foreign currency, debt and equity securities, operations with deposits and loans, formation of reserves, etc.) and assessment of each sector's contribution to the territory's socio-economic development. However, such tools create serious limitations for work, since the statistics, used for its implementation, are generated at the macroeconomic level and rarely – at the regional level; in addition, they are updated once in five years, which makes it difficult to study the dynamics of financial resources between financial corporations and other sectors, and it excludes their analysis at the municipal level. In addition, this methodological approach does not allow predicting the impact of the banking sector on the territorial systems' provision with financial resources. A review of the scientific literature has shown that it is not common; it was used by E.A. Zakharchuk and A.F. Pasynkov [26], D.A. Tatarkin, E.N. Sidorova, A.V. Trynov [27], I.V. Naumov [24; 25], R. Stone [28], G. Pyatt, J.I. Round [29], H. Khan, E. Thorbecke[30].

The third methodological approach, econometric modeling, unlike others, allows justifying the impact of resources for territories' socio-economic development, attracted by the banking sector, evaluating the effectiveness of certain investment tools to attract resources, creating a forecast of the territories' provision with financial resources, and setting the

amount of credit institutions' resources required to increase territorial security using functional dependences. In this regard, to justify the key role of the banking sector and its financial resources in solving the problems of improving budgetary security of entities of the Russian Federation and their socio-economic development and determining the scope of the resources, we will apply the tools of statistical analysis and regression modeling. As the base information, we intend to use official data of the Federal State Statistics Service on income and expenditure volumes of regions' consolidated budget, data of the Ministry of Finance of the Russian Federation on changes of the government debt of entities of the Russian Federation for the 2016–2018 period, regional statistical data of the Central Bank of the Russian Federation on banks' investments in debt and equity securities, the volume and structure of bank lending in 85 entities of the Russian Federation for the 2008–2018 period. The initial stage of the research implies the calculation and analysis of the dynamics of regions' fiscal capacity (differences in revenues and expenditures of the consolidated budget of the RF entities). To do this, we will calculate a three-year weighted average indicator of fiscal capacity covering the 2016–2018 period:

$$\overline{БО}_р = \frac{\sum(Д_р - Р_р)}{3}, \quad (1)$$

where $\overline{БО}_р$ – weighted average for the last three years indicator of the fiscal capacity of a region, mil. rub.;

$Д_р$ – revenues of the consolidated budget of a RF entity, mil. rub.;

$Р_р$ – expenditures of the consolidated budget of a RF entity, mil. rub.

The need to use a weighted average indicator is caused by the importance of considering not only a current financial situation in the region but also a recently developed trend. The analysis of data on fiscal capacity in dynamics showed that many regions have had a deficit budget over the past few years, and, in 2018, some of them formed a budget surplus. For a correct assessment of the entities' fiscal capacity, the calculation of the average indicator for the last three years is proposed. The analysis will help to identify regions with budget deficits for which the issues of forming the financial basis for implementing the spatial strategy and solving the most important problems of socio-economic development are the most acute.

At the next stage, based on data of the Ministry of Finance of the Russian Federation, it is planned to study the structure of the government debt of entities of the Russian Federation and the banking sector's contribution of financial resources to its formation using the indicator:

$$\overline{БФ}_р = \frac{\sum \frac{(ГЦБ_р + КСФ_р)}{ВД_р} \times 100}{3}, \quad (2)$$

where: $\overline{БФ}_р$ – weighted average relative share of financial resources of the banking sector in the structure of government debt of an entity of the Russian Federation for 2016–2018, %;

$ГЦБ_р$ – volume of state and municipal securities issued by entities of the Russian Federation and purchased by financial institutions, mil. rub.;

$КСФ_р$ – amount of bank loans allocated to entities of the Russian Federation and their municipalities, mil. rub.;

$ВД_р$ – total government debt of an entity of the Russian Federation, mil. rub.

According to data, published by the RF Ministry of Finance, government debt of entities of the Russian Federation is formed as a result of the release of state and municipal debt securities by the authorities and their implementation by financial institutions, attraction of bank and budget loans, state guarantees. The calculation and analysis of

the weighted average relative share of financial resources of the banking sector in the structure of the government debt of an entity of the Russian Federation will allow assessing the trend of the past three years rather than random values that appeared in 2018 and determining the contribution of financial resources of the banking sector to increasing fiscal capacity of regions. At the third stage, to study the spatial features in the distribution of financial resources of the banking sector, allocated to smooth out the regional budget deficit, it is proposed to compare fiscal capacity of regions and the share of financial resources of the banking sector in the formation of their government debt by spatial grouping. During its implementation, three sub-groups (with a low, medium, and high level of contribution of the banking sector's financial resources to the formation of the government debt of entities of the Russian Federation) were identified within two groups of regions (with a surplus and deficit consolidated budget). Differentiation of territorial systems by the contribution of financial resources of the banking sector to the formation of the government debt of regions ($\overline{БФ}_р$) is made using the following threshold values:

1. Territorial systems with high value of $\overline{БФ}_р$, exceeding upper border of mean-squire deviation of an indicator from an average value in RF:

$$\overline{БФ}_р > (\overline{БФ} + \sqrt{\frac{\sum(\overline{БФ}_р - \overline{БФ})^2}{n}}), \quad (3)$$

where: $\overline{БФ}_р$ – three-year average weighted (2016–2018) relative share of the banking sector's financial resources in the structure of a region's government debt, %;

$\overline{БФ}$ – average Russian level of relative share of the banking sector's financial resources in the structure of a region's government debt, %.

2. Territorial systems with higher than average relative share value of the banking sector's financial resources in the structure of a region's government debt:

$$\overline{БФ} < \overline{БФ}_р \leq (\overline{БФ} + \sqrt{\frac{\sum(\overline{БФ}_р - \overline{БФ})^2}{n}}). \quad (4)$$

3. Territorial systems with a low value of relative share of banks' financial resources in the structure of the RF entities' government debt ($\overline{БФ}_р \leq \overline{БФ}$).

As a result of this research stage, we expect to identify centers of financial resources concentration in the banking sector, aimed at increasing fiscal capacity of the RF entities, and territories having difficulties in attracting banks' resources required for the implementation of strategic initiatives and solution of the most important socio-economic development problems. To justify the key role of the banking sector in solving problems concerning the improvement of the regional budgets' balance and ensuring GRP growth, it is planned to conduct multiple regression analysis using a panel of statistical data next. This analysis implies the construction of the regression model of the impact of investments, attracted by the banking sector, on government debt securities of the RF entities and their municipal institutions, as well as the impact of loans on income level of the RF entities' consolidated budget ($Д_р$). The generated equation of the regression model will allow determining the amount of financial resources that the banking sector can attract to increase the budget provision of regional systems. At this stage, it is expected to form a regression model of the dependence of the GRP level of the RF entities on credit institutions' investments in state and corporate securities, shares, volume of loans allocated to households, non-financial organizations, credit

organizations, and other financial institutions. This model can be further used by public authorities to predict the dynamics of changes in GRP in entities of the Russian Federation, as well as to develop management decisions.

The novelty of the proposed methodological approach to this research is the integrated usage of statistical and mathematical methods of data analysis, spatial analysis of distribution processes of the banking sector's financial resources, allocated for investments in state and municipal securities and loans of the RF entities. Research in this area is characterized by the usage of statistical methods or spatial analysis methods. We attempted to substantiate the key importance of the banking sector's financial resources in the regions' socio-economic development using regression analysis. The novelty of the proposed approach is in the systematic representation of the banking sector's contribution to the territories' socio-economic development. We tried to assess the impact of financial resources, attracted to increase fiscal capacity, and bank lending for all economic entities on the level of regions' economic development (GRP).

Research of regions' fiscal capacity and contribution of the banking sector's financial resources to its increase

A study of the dynamics of territories' fiscal capacity for the 2016–2018 period showed that only 18 regions had a surplus budget during the whole period. The highest surplus level was in Moscow; Bashkortostan, Tatarstan, and Dagestan republics; Primorsky, Altai, and Krasnodar krais; Chelyabinsk, Voronezh, Rostov, and Tver oblasts. In 2018, the deficit budget was typical for 15 entities of the Russian Federation, the rest had an excess of consolidated budget revenues over its expenditures. However, we cannot conclude that the majority of regions have a high fiscal capacity, since 67 entities of the Russian Federation had a deficit budget in the 2015–2017 period. The most acute shortage of budget resources in recent years has been occurring in the Moscow, Sakhalin, Yaroslavl, Magadan regions, Krasnoyarsk and Khabarovsk territories, and the Republic of Mordovia. The calculation of the three-year weighted average allowed confirming the conclusion about insufficient fiscal capacity in many regions (*Tab. 1*).

Table 1. Weighted average indicator of the region's fiscal capacity for 2016–2018 ($\overline{БО}_р$), mil. rub.

Regions with high budget surpluses (above average)		Regions with high budget deficit (above average)	
Moscow	59670	Moscow Oblast	-12790
YaNAO	20238	Saint Petersburg	-17508
Kemerovo Oblast	16901	Krasnoyarsk Krai	-7394
Republic of Bashkortostan	15471	Republic of Mordovia	-7164
Tyumen Oblast	13515	Khabarovsk Krai	-7080
Krasnodar Krai	11939	Sakhalin Oblast	-6304
Vologda Oblast	8821	Republic of Crimea	-5284
Primorsky Krai	8597	Yaroslavl Oblast	-3347
Chelyabinsk Oblast	6739	Other regions with budget deficit	
Republic of Tatarstan	6551	Tomsk, Oryol, Volgograd, Tambov, Kostroma, Kurgan, Omsk, Magadan, Kaliningrad, Ulyanovsk, Arkhangelsk, Tula, Kirov, Pskov, Penza oblasts	
Voronezh Oblast	6340		
Republic of Dagestan	5811	Khakassia, Buryatia, Sakha (Yakutia), Kalmykia, Karelia, Adygea, Udmurt, Kabardino-Balkarian, Karachay-Cherkess republics	
Altai Krai	5419	Zabaykalsky Krai, Jewish AO, Nenets AO, Sevastopol	

Source: *Regions of Russia. Socio-Economic Indicators*. Available at: http://rosstat.gov.ru/bgd/regl/b19_14p/Main.htm (accessed: August 3, 2020).

According to the table, the highest deficit of budget resources over the past three years was observed in the Moscow Oblast, St. Petersburg, regions with the highest level of business activity and a high concentration of attracted investments in fixed capital and foreign direct investments. The budget deficit of most entities of the Russian Federation is associated with the government implementation of major investment projects for the development of transport, engineering, and energy infrastructure. The need to implement the spatial strategy, currently being developed in each region, by 2025 creates an additional burden on the budget of the RF entities.

Given the growing crisis in the economy and limited federal budget, not all regions will be able to obtain state loans to cover the budget deficit and implement strategic projects and programs of socio-economic development. In this regard, the issue of debt securities by entities of the Russian Federation and their municipalities, as well as the acquisition of bank loans, becomes an important area for attracting additional financial resources to regional budgets. As of January 1, 2020, the total public debt of constituent entities of the Russian Federation amounted to 2493,4 billion rubles. Compared to 2016, its volume decreased slightly – by 8.2%. Its structure was formed at the expense of budget loans (42%), allocated to the RF entities, bank loans (33%), and investments received from financial institutions in debt securities of entities of the Russian Federation and their municipalities (25%). The total share of the banking sector in the public

Table 2. Structure of public debt of the RF entities with the highest share of financial resources of the banking sector as of January 1, 2020

RF entity	Amount of funds raised as a result of the issue and sale of state and municipal securities, mil. rub.	Loans from credit institutions and foreign banks allocated to entities of the Russian Federation and their municipalities, mil. rub.	Budget credits allocated to the RF entities and their municipalities from other budgets of the budget system of the Russian Federation, mil. rub.	Share of financial resources of the BS in the government debt of the RF entities, %
Moscow	30000	0	0	100
Saint Petersburg	30100	0	0	100
Nenets AO	1600	60	0	100
Moscow Oblast	82750	89802	16674	91
KhMAO	13000	3294	2311	88
Tambov Oblast	8100	10219	3791	83
Pskov Oblast	0	14803	3247	82
Republic of Buryatia	0	12734	2753	82
YaNAO	12961	0	3514	79
Khabarovsk Krai	4074	40216	11621	79
Nizhny Novgorod Oblast	50300	20282	20236	78
Oryol Oblast	5000	10619	4709	77
Tomsk Oblast	19402	8608	8188	77
Krasnoyarsk Krai	60031	11389	24196	75
Komi Republic	18595	2579	7294	74
Sverdlovsk Oblast	25000	34407	21881	73
Republic of Sakha	33125	5035	14851	72
Samara Oblast	31965	15010	18384	72
Kurgan Oblast	0	12969	5037	72
Novosibirsk Oblast	29751	17480	19917	70

Source: data of the Ministry of Finance of the Russian Federation. Available at: https://minfin.gov.ru/ru/perfomance/public_debt/subdbt/ (accessed: August 3, 2020).

debt of all entities of the Russian Federation at the beginning of 2020 was 58%. In 34 regions, the share of financial resources of the banking sector in the government debt significantly exceeded this value (*Tab. 2*). The most significant contribution of the banking sector to improving fiscal capacity was in Moscow, St. Petersburg, and the Nenets Autonomous Okrug.

In these regions, the government debt was formed at the expense of the banking sector's investments in debt securities. The share of the banking sector's financial resources, exceeding 70%, in the government debt of the RF entities was recorded in Moscow, Tambov, Pskov, Nizhny Novgorod, Orel, Tomsk, Sverdlovsk, Samara, Kurgan, and Novosibirsk oblasts; KhMAO, YaNAO, Khabarovsk and Krasnoyarsk krais; Buryatia, Komi, and Sakha republics. The government debt of most regions was formed as a result of the implementation of state and municipal securities, issued by the RF entities. Bank loans were the most actively attracted in Kurgan and Pskov oblasts and the Republic of Buryatia. They did not use debt securities for increasing fiscal capacity. This instrument of attracting additional financial resources was not used in 43 regions. Their public debt was formed at the expense of bank and budget lending, which is a negative trend, since debt securities, unlike loans, help attract long-term investments the return of which is carried out at the end of the securities' validity period during its repayment. Spatial distribution of the three-year average weighted value of the share of the banking sector's financial resources in the structure of the RF entities' government debt (*Fig. 1*) showed that bank

Figure 1. Average weighted relative share of the banking sector's financial resources in the structure of the RF entities' government debt for 2016–2018, %

Source: data of the Ministry of Finance of the Russian Federation. Available at: https://minfin.gov.ru/ru/perfomance/public_debt/subdbt/ (accessed: August 3, 2020).

capital is in the most demand in regions with advanced economic development (Moscow, St. Petersburg; Moscow, Leningrad, Nizhny Novgorod, and Samara oblasts) and in the mineral resource centers of Russia (KhMAO, YaNAO, Nenets AO; Arkhangelsk and Tomsk oblasts; Krasnoyarsk Krai; Republic of Buryatia).

In some of them, despite a substantial inflow of the banking sector's financial resources, there is a budget deficit[2] (*Tab. 3*): in Nenets Autonomous Okrug (280 mil. rub.), the Republic of Buryatia (1869 mil. rub.); Tambov (1853 mil. rub.), Tomsk (2326 mil. rub.), and Moscow (12790 mil. rub.) oblasts; Krasnoyarsk Krai (7394 mil. rub.) and St. Petersburg (17508 mil. rub.).

According to the Spatial Development Strategy of the Russian Federation until 2025, St. Petersburg and towns of the Moscow Oblast are the promising centers of economic growth, Krasnoyarsk Krai and the Nenets Autonomous Okrug are promising mineral resource centers for the production of oil and natural gas, the Tambov Oblast is a promising agro-industrial center, the Tomsk Oblast is a promising world-level academic-educational center, and the Republic of Buryatia is a priority geo-strategic territory. Within a serious budget deficit, the implementation of these strategic initiatives becomes a difficult task and the banking sector's financial resources, which are currently attracted in a significant amount, make a significant contribution to improving the budget security of these regions.

Table 3 data show that deficit budget also exists in formed promising mineral-resource centers for gold mining – the Magadan Oblast (1166 mil. rub.); diamonds, gold, fuel, and energy resources – the Republic of Sakha (1148 mil. rub.); promising agro-industrial centers – Volgograd (2025 mil. rub.) and Penza (102 mil. rub.) oblasts; border geostrategic territories of the Russian Federation – Kurgan (1809 mil. rub.), Omsk (1613 mil. rub.), Pskov (1008 mil. rub.) oblasts; Jewish AO (677 mil. rub.), the Kabardino-Balkarian Republic (1241 mil. rub.), and Khabarovsk Krai (7080 mil. rub.). At the same time, some regions, marked in gray in the table, have an extremely high level of the government debt (more than 50% with an average number of 29.3% in Russia) in relation to consolidated budget revenues as of January 1, 2020. With such a budget deficit, the implementation of the spatial and socio-economic development strategies, currently being formed in the regions, is impossible without additional financial support from the government and the banking sector. In entities with a low fiscal capacity and low volume of the banking sector's attracted financial resources, with the exception of the Republic of Mordovia, the Kirov Oblast, and the Zabaykalsky Krai, the debt burden on the budget does not exceed the average level in Russia. In this regard, we consider it possible to implement the spatial strategy (the formation of a promising mineral resource center for coal mining in the Sakhalin Oblast and the border geostrategic territories in the Crimea and Sevastopol, the Karachay-Cherkess Republic, the Kaliningrad Oblast) to increase the government debt of entities of the Russian Federation by attracting the banking sector's financial resources.

To study the contribution of the banking sector's financial resources into the increase of regions' fiscal provision and opportunities for reasonable determination of the volume of the required debt securities' issue in order to attract the banking sector's financial resources, we conducted multiple least squares regression analysis using panel data.

[2] According to average weighted indicator of budgetary provision for 2016–2018.

Table 3. Grouping of regions by the level of fiscal capacity and the contribution of the banking sector to the formation of the government debt of entities of the Russian Federation, %

	Regions with a high share of financial resources of banks in the government debt structure		Regions with a higher than average share of banks' financial resources in the government debt structure		Regions with the share of financial resources of banks in the structure of the government debt below the average level
Regions with a surplus budget	Moscow	92.8	Voronezh Oblast	62.6	Vologda, Chelyabinsk, Tyumen, Astrakhan, Tver, Kursk, Bryansk, Ryazan, Amur, Vladimir, Kaluga, Leningrad, Smolensk, Novgorod oblasts
	YaNAO	79.4	Krasnodar Krai	52.3	
	KhMAO	88.7	Kemerovo Oblast	48.6	
	Komi Republic	77.6	Mari El Republic	59.1	
	Nizhny Novgorod Oblast	76.2	Sverdlovsk Oblast	69.7	
	Samara Oblast	74.4	Novosibirsk Oblast	68.5	
			Stavropol край	58.9	
			Lipetsk Oblast	56.5	Bashkortostan, Dagestan, Tatarstan, Tyva, Altai, North Ossetia, Ingushetia, Chechnya republics
			Ivanovo Oblast	56.3	
			Rostov Oblast	56.3	
			Irkutsk Oblast	54.8	
			Perm Krai	53.1	
			Belgorod Oblast	52.5	Primorsky, Kamchatka, Altai krais
			Murmansk Oblast	51.6	Chukotka Autonomous Okrug
			Orenburg Oblast	49.6	
			Chuvash Republic	48.7	
			Saratov Oblast	52.2	
Regions with budget deficit	Nenets AO	100	Ulyanovsk Oblast	68.5	Adygea, Kalmykia, Crimea, Karachay-Cherkess, Mordovia republics
	Republic of Buryatia	78.4	Magadan Oblast	68.1	
	Tambov Oblast	76.4	Kurgan Oblast	66.9	
	Tomsk Oblast	73.9	Omsk Oblast	66.3	Kaliningrad, Sakhalin, Kirov oblasts
	Moscow Oblast	79.2	Pskov Oblast	65.4	
	Krasnoyarsk Krai	76.7	Volgograd Oblast	61.0	
	Saint Petersburg	76.3	Arkhangelsk Oblast	59.7	Zabaykalsky Krai
			Penza Oblast	58.9	Sevastopol
			Republic of Karelia	54.9	
			Tula Oblast	54.7	
			Republic of Sakha	52.2	
			Kabardino-Balkarian Republic	49.1	
			Khabarovsk Krai	67.2	
			Yaroslavl Oblast	64.4	
			Oryol Oblast	62.8	
			Udmurt Republic	58.9	
			Republic of Khakassia	54.7	
			Kostroma Oblast	54.0	
			Jewish AO	52.4	

Note: Gray color indicates the ratio of the government debt to consolidated budget revenues exceeding 50% for 2019.
Source: *Regions of Russia. Socio-Economic Indicators*. Available at: http://rosstat.gov.ru/bgd/regl/b19_14p/Main.htm (accessed: August 3, 2020); data of the Ministry of Finance of the Russian Federation. Available at: https://minfin.gov.ru/ru/perfomance/public_debt/subdbt (accessed: August 3, 2020).

We chose the indicator "volume of revenues of an RF entity's consolidated budget" (Д), and the indicators "volume of government and municipal debt securities purchased by banks and financial institutions" (ЦБ), "volume of bank loans allocated to entities of the Russian Federation and their municipalities" (К), and "volume of budget loans allocated to entities of the Russian Federation" (БК). In the course of regression modeling, the presence of correlation relationships between factor features, linearity/nonlinearity, as well as the homogeneity of the distribution of the studied sample of observations was evaluated. After removing the factors that form multicollinearity from the model, we established the dependence of the RF entities' consolidated budget revenues on the investments of banks and financial institutions in their debt securities is established:

$$Д = 67280{,}8 + 9{,}9 \times ЦБ\,, \qquad (5)$$

where: Д – volume of consolidated budget revenues, mil. rub.;

ЦБ – volume of government and municipal debt securities purchased by banks and financial institutions, mil. rub.

The evaluation of the regression statistics, obtained as a result of the analysis, indicates that the formed model is reliable, the main parameters of the regression are statistically significant (correlation coefficient R = 0.87 exceeds the value 0.7; the significance F of the obtained equation and the determination coefficient does not exceed the standard value of 0.05; P-values of regression coefficients are within acceptable values). The developed model showed the primary importance of investments of the banking sector in debt securities of entities of the Russian Federation and their municipalities in increasing their fiscal capacity. Budget and bank lending are secondary factors in attracting additional financial resources to the regional budget. The model is constructed with information about upcoming budget expenditures, and it allows predicting fiscal capacity of the regions with the change in the dynamics of investments in debt securities,

Table 4. Calculation of the volume of required investments in debt securities of entities of the Russian Federation to solve the problem of budget deficit, mil. rub.

RF entity	Budget expenditures in 2018	Budget deficit in 2018	Debt securities issued and sold by the RF entities in 2018	Volume of investments in securities whose attraction would allow solving the problem of the budget deficit of the RF entities in 2018 (ЦБ)	Modeled budget revenue (Д = 67280,8+9,9×ЦБ)
Regions with high budget deficit					
Moscow Obl.	703478	-12790	37500	64471	703478
Saint Petersburg	579701	-17508	30100	51928	579704
Khabarovsk Krai	132509	-7080	4074	6611	132518
Sakhalin Obl.	165315	-6304	0	9935	165319
Republic of Crimea	175471	-5284	0	10964	175473
Other regions with budget deficit					
Kaliningrad Obl.	123973	-1107	2707	5746	123982
Arkhangelsk Obl.	89932	-1055	0	2296	89938
Tula Obl.	89150	-685	1500	2217	89158
Zabaykalsky Krai	70424	-501	0	319	70429
Nenets AO	189381	-280	2000	12374	189387

Source for the 2nd and 3rd columns: *Regions of Russia. Socio-Economic Indicators*. Available at: http://rosstat.gov.ru/bgd/regl/b19_14p/Main.htm (accessed: August 3, 2020); source for the 4th column: data of the Ministry of Finance of the Russian Federation. Available at: https://minfin.gov.ru/ru/perfomance/public_debt/subdbt (accessed: August 3, 2020); columns 5 and 6 present the results of the calculation using the constructed regression model (5).

as well as to determine an optimal amount of required investments in the securities of the RF entities to solve the budget deficit (*Tab. 4*).

According to the constructed model, the relevant problem of the budget deficit in the Moscow Oblast in 2018 could be solved by additional issuance and sale of debt government and municipal securities in the amount of 269.71 mil. rub. (up to 64471 mil. rub.), in Saint Petersburg – by 21828 mil. rub., Nenets AO – by 10374 mil. rub., the Kaliningrad Oblast – by 3039 mil. rub., in Khabarovsk Krai – by 2537 mil. rub., and the Tula Oblast – by 717 mil. rub. The issue of securities in the amount presented in table 4 would attract additional financial resources to the Sakhalin and Arkhangelsk oblasts, the Republic of Crimea, and the Zabaykalsky Krai, increasing their budget security.

To substantiate the key role of banking sector's financial resources in the socio-economic development of regions, we conducted a regression analysis using panel data on entities of the Russian Federation for 2008–2018. After analyzing 935 cases, we constructed a model of the dependence of the GRP of the RF entities on the investments of enterprises in fixed capital, direct foreign investment and banks' financial resources, and other credit institutions:

$$GRP = 51010{,}78 + 3{,}229 \times IFA + 1{,}054 \times FI + 0{,}463 \times BL + 0{,}007 \times BIS, \quad (6)$$

where: GRP – Gross regional product, mil. rub.;

IFA – Investments in fixed assets, mil. rub.;

FI – Foreign investments, mil. rub.;

BIS – Bank investments in government and corporate debt securities, shares, registered promissory notes, mil. rub.;

BL – Volume of bank lending of financial, non-financial corporations, individuals, mil. rub.

On the basis of the results of the regression analysis, presented in *table 5*, we can conclude that the model and its main parameters are reliable.

The correlation coefficient in the model is close to one, the null hypothesis of the insignificance of the coefficient of determination is rejected ($Prob_{(F\text{-statistic})} < 0.05$), statistical significance of regression coefficients is confirmed (Prob. < 0.05), the model lacks multicollinearity and autocorrelation between

Table 5. Regression analysis results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	51010,78	11737,81	4,345852	0.0000
IFA	3,229107	0,062070	52,02324	0.0000
FI	1,053551	0,107138	9,833557	0.0000
BIS	0,463158	0,132272	3,501569	0,0004
BL	0,006531	0,023452	0,278523	0.0425
R-squared	0,962216	Mean dependent var		605794,5
Adjusted R-squared	0,962054	S.D. dependent var		1335497
S.E. of regression	275197,1	Akaike info criterion		27,556
Sumsquared resid	4.13E+13	Schwarz criterion		27,587
F-statistic	5921,045	Durbin-Watson stat		2,159
Prob (F-statistic)	0.000000			

Note: the results of regression analysis of the dependence of the RF entities' GRP on the investment of enterprises in fixed capital, direct foreign investments, banks' financial resources, and other credit institutions are presented using panel data (935 cases) by the RF entities for 2008–2018.
Source: data on the amount of investments of the banking sector are taken from the regional section of statistics of credit institutions of the RF Central Bank. Available at: http://cbr.ru (accessed: August 3, 2020).

residues. As a result of modeling, we came to the conclusion that the attraction of additional financial resources of banks and other credit institutions, investment of enterprises in fixed capital and foreign direct investment will contribute to the growth of GRP of considered territorial systems. The banking sector has significant financial resources that can be used to increase the budget provision of regions and their municipalities, solve relevant problems of socio-economic development, and implement currently formed spatial strategies. Unfortunately, today, the banking sector implements a speculative policy of managing financial resources: credit institutions invest in shares and securities of foreign issuers, foreign currency, the exchange rate of which is currently highly volatile, and risky derivative financial instruments (futures, options, and other derivatives). High volatility in the financial and commodity markets, uncertainty in the domestic economy development contribute to an active outflow of financial resources of the banking sector abroad. To attract such resources to the Russian economy, we consider it necessary to change the government's monetary policy in terms of regulating the key rate, using mechanisms of state support for credit institutions, such as subordinated lending, subsidizing part of the interest rate on bank loans and investments attracted in debt securities of entities of the Russian Federation and their municipalities. The monetary policy implemented by the state should be subordinated to the goals of economic development, stimulate financial institutions, and create conditions for the progressive socio-economic development of territorial systems.

Conclusion

The reported study presents the methodological approach to substantiating the role of the economy's banking sector in increasing regions' fiscal capacity and their socio-economic development. It implies: 1) calculation and analysis of the dynamics of the RF entities' fiscal capacity aimed at looking for territorial systems with the most acute issues related to the formation of financial foundations for implementing spatial strategy; 2) study of the structure of the RF entities' government debt and contributions of the banking sectors' financial resources to its formation; 3) analysis of spatial features of the distribution of the banking sector's financial resources aimed at smoothing the regional budget deficit; 4) construction of the regression model of the impact of attracted financial resources by the banking sector on increasing regions' fiscal capacity; 5) determination of financial resources of credit institutions whose involvement will solve the problem of the RF entities' budget deficit; 6) consideration of the contribution to the economic development of regions and the banking sector's other financial resources using spatial-temporal regression modeling.

A study of the dynamics of regions' fiscal capacity for the 2016–2018 period showed that only 18 of them had a surplus budget during the entire period. In the context of insufficient fiscal capacity and the deteriorating economic situation, the vast majority of regions do not have financial resources to implement spatial strategies, which are currently being developed.

The analysis of the structure of the government debt of entities of the Russian Federation indicates a significant role of the banking sector in its formation. Currently, 58% of the RF entities' government debt is formed by bank loans, as well as state and municipal debt securities sold to financial institutions. Spatial distribution of the three-year weighted average value of the share of the banking sector's financial resources in the

structure of government debt of the RF entities showed that bank capital is most in demand in central regions with a high level of economic development (Moscow, Saint Petersburg; Moscow, Leningrad, Nizhny Novgorod, Samara oblasts) and mineral resource centers of Russia (KhMO, YaNAO, Nenets AO; Arkhangelsk and Tomsk oblasts; Krasnoyarsk Krai, the Republic of Buryatia). Constructed regression models allowed substantiating the hypothesis about a significant contribution of the banking sector's attracted financial resources to improving budget sufficiency of the RF entities and their municipal formations, as well as to socio-economic development of these territorial systems. The formed model helped to determine the amount of financial resources of credit institutions whose involvement will contribute to solving the problem of the budget deficit in entities of the Russian Federation.

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Received July 31, 2020.

DOI: 10.15838/esc.2020.6.72.10
UDC 332.14, LBC 65.050

Asymmetry Problems of Structural Shifts in Regional Economy*

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Abstract. In the absence of a significant dynamics of economic growth rates in the Russian Federation and its regions and the exhaustion of the recovery increase potential, a negative impact of economic crises and existing export-raw production orientation manifest themselves especially clearly. As a result, a necessity to find new development drivers, which includes a great significance of the structural factor of the economic growth at the regional level in the context of achieving economic growth of the country, becomes relevant. In this regard, the purpose of the research is the analysis of structural shifts in regional economy at different phases of the economic dynamics. The novelty of the research is the definition of the contribution of structural shifts in the region's economic growth at different phases of the economic dynamics. The methodology is based on the calculation of structural shifts' indicators – magnitude, index, velocity, and power. We conducted the analysis of sectoral structural transformations of the regional economy on the basis of the Vologda Oblast's materials for 2005–2018.

* The reported article was funded by RFBR. Grant no. 19-010-00709 "Modeling and design of interregional value chains based on the inter-industry balance methodology".

For citation: Rumyantsev N.M., Leonidova E.G. Asymmetry problems of structural shifts in regional economy. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 169–183. DOI: 10.15838/esc.2020.6.72.10

The research revealed a low diversification and efficiency of adding economy into global chains of value added. We calculated the impact of the structural factor on the growth of gross regional product depending on an increase or decline in the economy. The activation of the potential of agriculture, mechanical engineering, and electronic industry sectors is seen as very promising. We calculated the multipliers of the impact of the stimulation of the proposed sectors on the basis of the inter-sectoral balance model. We reviewed the structural-investment policy as an important instrument of changing national economic proportions. The idea of forming the benchmarking system, concerning the efficiency of conducted structural policy, was substantiated. A practical importance of the research is an opportunity to use its results by authorities for the formation of regional structural policy. We will continue the studies related to the determination of the dependence of regional economy's growth dynamics on structural dynamics in the investment process, organization of the factor analysis of the industry shifts and economic growth, and formation of the system of optimal indicators of the structural policy benchmarking.

Key words: structural shift, economic growth, region, investments, regional economy, sectoral structure.

Introduction

In modern dynamically changing global geopolitical and geo-economic environment, a steady economic growth is a key purpose of the Russian Federation's economic policy. However, due to a multi-level Russian economy, this issue must be solved not only at the federal and sub-federal levels. Regions must be the flagships of the state's economic policy within the strengthening of the national economy.

Areas of the regions' economic growth intensification include the development of interregional cooperation, active implementation of the import substitution policy, stimulation of entrepreneurial activity, and formation of strong "business-power" ties [1]. Nevertheless, there is a need for a new driver of economic development due to the regions' dependence on foreign economic conditions, stagnation of technical and technological development of production based on the production base of the Soviet Union, as well as a decrease in consumer demand [2]. Managed structural transformations can become such a driver: especially ones necessary for the sectoral structure of the regional economy [3]. This is related to a number of reasons: first, there is a decline in the economic growth due to a significant impact of global financial crises and foreign sanctions. Second, the structure of the Russian economy and most regions does not effectively fit into the global economy due to the raw material orientation and the industry of primary processing. Third, a low investment and scientific and innovative activity of the economy does not allow imposing competition on imported products.

It is important to note that, due to a weak diversification of the Russian economy and its raw material orientation, the inclusion of regional economies in interregional and international value added chains (VAC) is quite difficult. At the moment, the participation of the country's economy in VAC is related to its integration as a supplier of raw materials, which does not provide the growth effect of high-tech and competitive industries but only inflates the export commodity sector. To integrate national and regional economies into global production chains, the importance of studying economic sectors' structural shifts increases.

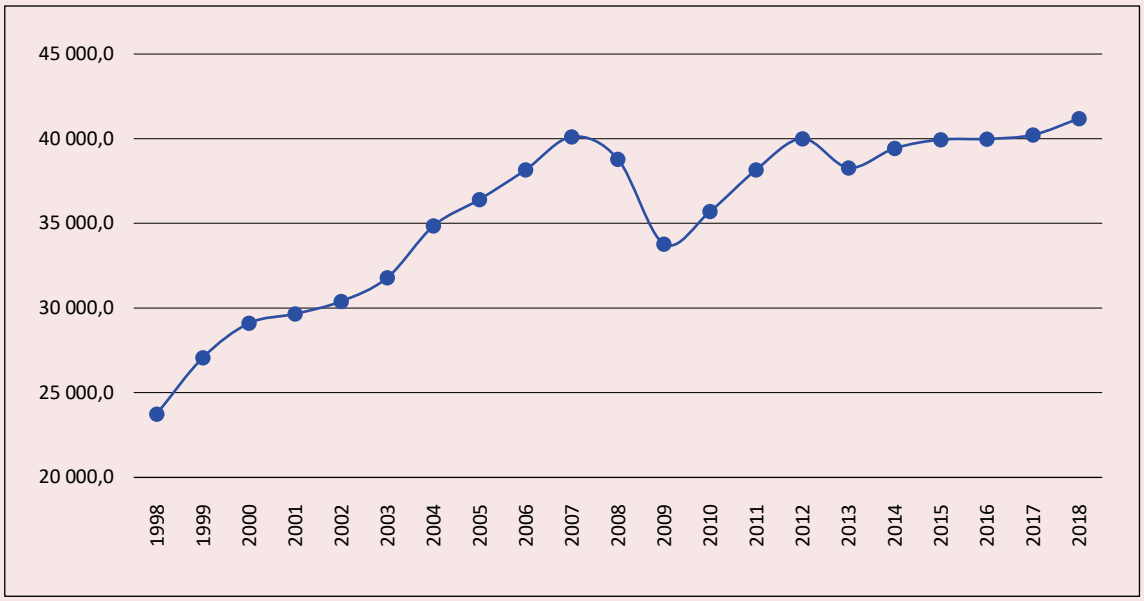
The relevance of this research is related to the need to obtain quantitative estimates of structural transformations taking place in the regional economy that makes it possible to form an analytical basis for the study of value added chains based on the methodology of interindustry balance, which also relies on national economic proportions.

Structural shifts are assessed using a case-study of the Vologda Oblast – an old industrial region of the Russian European North with an export-oriented mono-structured economy [4]. The choice of an entity for the analysis is caused by the fact that the transformation of old-industrial regions can become the engine of the economic growth due to a significant scientific, technical, and production potential [5–7]. At the same time, a number of acute problems in the development of these regions at the moment can turn them into a stopper of the national economy.

The Vologda Oblast was not able to completely rebuild itself during the transition to the market, and it turned from a donor-region into one of the subsidized ones. Demonstrating stable initial growth, the region's economy poorly reacted to the 2008–2009 global financial crisis and the 2014–2015 currency crisis, which can be proven by changes in the gross regional product volume produced at comparable prices of 1998 (*Fig. 1*).

Analyzing the behavior of the gross regional product (GRP) volume curve, we can distinguish five periods of economic dynamics: 1998–2007, 2008–2009, 2010–2012, 2013–2014, and 2015–2018. Considering this, the purpose of the study was to analyze structural shifts in the industry structure of gross value added (GVA) at various stages of economic dynamics. Achievement of the research goal required solving the following tasks: quantitative assessment of structural changes, determination of their impact on economic dynamics, as well as development of directions for adjusting structural policy.

Figure 1. Dynamics of GRP in the Vologda Oblast's economy for 1998–2018 (in 1998 comparable prices), mil. rub.



Source: own compilation according to Rosstat data.

Theoretical and methodological aspects of the research

Issues of structural rebuilding of the economy and its impact on the economic growth more often become a topic for scientific findings among Russian and foreign researchers. In the work of RAS corresponding member V.A. Ilyin, the necessity of breakthrough changes in the country's economic strategy is substantiated; its main driver may be the structural rebuild of Russian economy [8]. The work of T.V. Uskova and E.V. Lukin evaluates the results of the assessment of main structural changes of regional economy and states that the structural policy is the main instrument of the economic policy for achieving balanced and sustainable development [9]. Also, a team of American researchers empirically justified the hypothesis that the structural policy may accelerate economic growth rates in a short-term perspective [10], and A.A. Shirov states that the GVA change may be caused by a single transformation of the economic structure even with a zero output change[1]. The works [11–12] highlight the importance of the structural policy in investments and social capital, name the economic structure issues at different phases of the economic dynamics in the country. The interconnection between the structural factor and development of value added chains in the economy is shown in the E.V. Lukin's work [13]. M. Peneder and J. Faderberg understand structural changes, aimed at the production diversification with an emphasis on high-tech processing industries [14–15], as the "growth locomotives". However, in general, the scientific community pays insufficient attention to structural shifts at the regional level and the interconnection between economic dynamics and changes of the national economy proportions.

The definition of a structural shift, which is taken as the base one in the study, is clearly formulated in the works of O.S. Sukharev who significantly contributed to the studying of structural transformations of the national economy. A structural shift is understood as a visible in its magnitude structural change which happened at a certain limited time interval, and it is clearly identified and registered because of this [16].

The methodological basis of the research is based on methodological approaches of such scientists as O.Yu. Krasil'nikov, Yu.S. Kharin and V.I. Malyugin, S.A. Suspitsin, B.A. Zamaraev and T.N. Marshova, I.K. Shevchenko and Yu.V. Razvadovskaya, and several foreign works on structural analysis [17–24]. Despite a significant number of scientific works in this area, issues of the structural shifts' impact on the region's economic growth, based on a quantitative assessment, are not thoroughly studied.

The reliability of conclusions is provided by the usage of such general scientific methods as the system approach, analysis and synthesis, induction and deduction, analogy, and the usage of special methods of the economic research – methods of grouping, comparison, and structural analysis of economic indicators. The information base of the study consists of data from the territorial bodies of the Federal State Statistics Service for the Vologda Oblast, data from the Unified Interdepartmental Statistical Information System, as well as the works of leading researchers in the field of regional economics.

To analyze structural economic transformations, a set of various indices is used for quantitative and qualitative assessment. For

[1] *Shirov A.A. Multilevel Structural Studies as a Tool for Economic Policy Justification: Diss. ... Doct. of Sci. (Econ.): 08.00.01.* Moscow, 2015. 335 p.

quantitative analysis of structural shifts in the regional economy, we used several indicators – the magnitude, velocity, index, and power of structural shifts [19].

The magnitude of the structural shift (*M*) is calculated as the difference between the shares of the industry in the structure of the economy for the base and current period (1).

$$M_i = d_i - d_{i0}, \quad (1)$$

where: i – sector, d_{i0} – relative share of i-sector for the base period, d_i – relative share of i-sector for the current period.

The magnitude indicator shows how sectoral proportions in the region's economy have changed, and it also allows assessing their uniformity.

However, it does not give an idea about the significance of the structural shift for the economy and the industry as a whole, so it should be supplemented with the structural shift index (2).

$$I_i = \frac{d_i - d_{i0}}{d_{i0}} = \frac{M_i}{d_{i0}}, \quad (2)$$

where: I_i – structural shift index, M_i – value of the structural shift in the studied period.

This indicator allows us to determine the significance of the structural dynamics of the national economy's sectoral proportions, and it resembles the variant coefficient in terms of content.

Velocity indicator (*V*), defined as a change of the structural shift magnitude per time unit (*T*), provides information on an average annual rate of the transformation of the national economy's proportions (3):

$$V_i = \frac{M_i}{T}. \quad (3)$$

The resulting indicator of the quantitative analysis of structural shifts in the economy will be an indicator of the structural shift's power (P), calculated using the formula (4). The greater this indicator, the greater the impact of the changes on the structural proportions of the region's economy is.

$$P_i = M_i \cdot V_I. \quad (4)$$

The aforementioned indicators will be calculated for the structure of gross value added. Structural changes will be considered for the period from 2005 to 2018, and industry statistics are provided for the OKVED-2007 (Russian Industry Classification System) for comparability of the indicators used.

Then, in order to measure the influence of structural changes on the economy, we used the metrics studied in the R.M. Uzyakov's work [25]. The influence on the economic dynamics is understood as a positive or negative shift in GRP growth at the expense of changes in sectoral proportions. At the same time, the growth phase takes into account the contribution of a positive growth of the sector's share in the structure, and, correspondingly, the decline phase considers a negative growth. With these provisions, the contribution of a summary increase in the share of sectors, which grew (declined) to the common rate of the GPR increase. Formula (5) describes the calculation of the metric during the growth phase of the economy, formula (6) – during the recession phase.

$$S^+ = \sum_{i=1}^{n} \Delta sh_i^+ / (X^t / X^{t-1} - 1), \quad (5)$$

where: S^+ – the share of the structural factor in increasing the growth rate of the economy, Δsh_i^+ – positive values of structural shifts of i-sector, X^t – GRP in t-year.

$$S^- = \sum_{i=1}^{n} \Delta sh_i^- / (X^t / X^{t-1} - 1), \quad (6)$$

where: S^- – the share of structural factor in the decline of economic growth, Δsh_i^- – negative values of structural shifts in the i-industry.

As E.V. Lukin notes [26], to maintain the uniformity of calculations, it is necessary to have a period of growth or decline. Consequently, 2016 should be excluded from the analysis due to the fact that the dynamics of economic growth is virtually zero.

The model of inter-sectoral balance is used to select industries that are priorities of structural policy. It contains enlarged types of economic activities: agriculture, hunting, forestry and fishing, mining, industry (without mining), construction, financial and non-financial services. The separation of the studied sectors was made on the basis of the aggregation of an expanded list of data separated by types of economic activity, reflecting the production of goods, work, and services provided by Russian enterprises.

The model is based on the basic equation of inter-industry balance, which is the following in the matrix form (7):

$$x = A_x + y, \quad (7)$$

where: x – vector of total production volume; A – matrix of coefficients of direct costs; y – vector of final product.

The following equation is used for modeling (8):

$$(E - A)^{-1} \cdot y = x, \quad (8)$$

where: E – identity matrix; $(E - A)^{-1}$ – matrix of total cost coefficients.

On the basis of acquired matrix dependence, it is possible to calculate the x volume realization in all economic sectors, if the change of the y final demand is planned[2].

Within the current research, it is necessary to conduct three analytical stages: a retro-spective assessment of the socio-economic development of the region, the study of structural changes in the sectoral proportions of the Vologda Oblast's economy, and the calculation of the metric of structural shifts' impact on economic dynamics.

Main research results

Prevailing sectors of the national economy in the Vologda Oblast are ferrous metallurgy and chemical production, food industry and timber industry complex are also developed. These sectors are the main areas of the investment activity in the region. Average annual growth rates of main indicators of the region's socio-economic development for studies periods are given in *table 1*.

Table 1. Average annual growth rates of the main indicators of socio-economic development of the Vologda Oblast, %

Indicator	2005–2007	2008–2009	2010–2012	2013–2014	2015–2018	2005–2018
Gross regional product (GRP)	104.8	91.8	105.8	99.3	101.1	101.2
Industrial production	106.2	92.9	106.1	103.1	102.3	102.6
Agricultural products	98.1	97.8	97.9	95.6	100.6	98.3
Investments in fixed capital	111.1	78.4	127.9	69.9	108.1	101.2
Commissioning of total area of residential buildings	117.7	100.1	92.6	141.1	91.2	104.2
Cargo transported by transport	97.4	89.5	103.3	100.0	100.6	98.7
Passengers transported by public transport	85.7	89.3	106.4	100.3	100.3	96.6
Retail trade turnover	113.0	98.5	114.4	101.8	98.6	105.3
Paid services to the population	109.3	102.9	100.1	100.2	98.7	102.0
Source: own calculation according to Rosstat and Vologdastat data.						

[2] More information on the usage of the inter-sectoral balance model and calculations, based on it, are given in [27].

Until 2008, there was an active economic growth, increase of the industrial production output on the background of reducing transport activity and agricultural industry; besides, there was the growth of consumer sector. During these years, the industry really was the driver of the Vologda Oblast's economy, and the region was one of a few donor-entities in the national economy of the country.

However, the 2008 global economic crisis significantly impacted the economy; there is a negative dynamics of the economic growth and noticeable shrinking of main types of activities due to reduced demand and price drops: it especially affected the locomotive of the Vologda economy – ferrous metallurgy. Clear recession followed by a reduced ruble's stability, decline on the labor market, and the freezing of investment projects due to a lack of funding.

Since 2009, a post-crisis recovery was difficult; the recession overcoming only began in the first half of 2010, but the next crisis of 2013–2014 gave an economy a chance to come back to the 2007 level only in 2018.

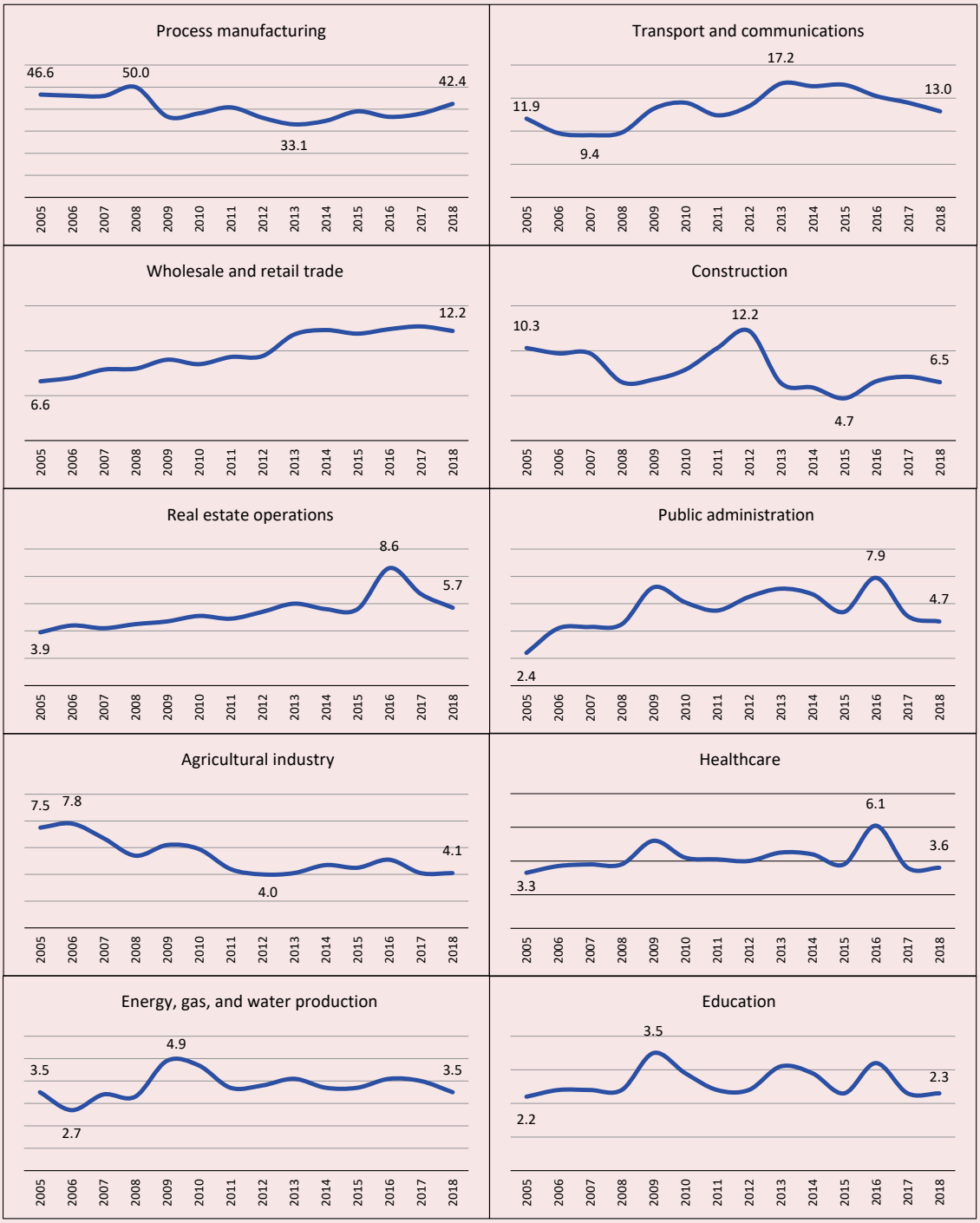
At the same time, over the whole studied period, there was a significant growth decline of industrial production and decrease in agriculture. The consumer demand sector as a whole showed growth but a significantly slow one in comparison with the pre-crisis period; there was a reduction of cargo and passenger traffic. The economy of the Vologda Oblast is in a state of stagnation, as its growth in most parameters significantly slowed down during the studied period.

The described processes of the dynamics of the region's national economy were accompanied by significant structural changes that determine quantitative and qualitative parameters of the economic growth. To analyze the deformations that occurred, we will consider changes in the industry structure of the GVA formation.

Figure 2 includes the changes in the relative share of the value added formation of major activity types in the Vologda Oblast's economy from 2005 to 2018. The analysis of the dynamics of shares of the sectoral structure of gross value added formation revealed that there is a general reduction in the share of the commodity production sector[3] (67.9% in 2005 vs. 56.9% in 2018) and an increase in the relative share of the service sector. Wholesale and retail trade, thanks to a stable growth in the studied period, has nearly doubled its share in the structure of the GVA formation, the importance of the financial services industry has increased, and the share of the public sector has grown. In general, the growth rate of the service sector's share significantly exceeds the growth rate of the material production sector's share. For the region, the reduction in the share of the commodity production, coupled with an unfavorable external economic situation, is dangerous because the region's exports are based on the industrial output – metal products, fertilizers, and intermediate consumption products. System-forming industries, losing revenue, strongly undermine the regional budget reducing the ability of regional authorities to stimulate the transformation of the Vologda Oblast's economy. Agriculture, which is important for the region's food industry and one of the most important processing industries, noticeably loses its positions.

[3] Industries that produce goods include agriculture, hunting and forestry, fishing and fish farming, mining, manufacturing, production and distribution of electricity, gas, and water, as well as construction. These sectors may also provide services, but their share in the total value added is small [4].

Figure 2. Dynamics of changes of the relative share of the main types of economic activity in the GVA formation structure in the economy of the Vologda Oblast for 2005–2018



Source: own compilation according to Rosstat data.

Turning to the index analysis of structural shifts in the analyzed components of the economic structure, it should be noted that the transformations within the structures of the GVA formation are not synchronous. This should be taken into account by the regional authorities when forming a structural policy.

The calculation of quantitative indicators, presented in *table 2*, shows that the most intensive transformation of the structure of the GVA formation occurred in the process manufacturing, trade, construction, and agriculture sectors.

The process manufacturing productions reacted differently to crisis phases of the economic dynamics: the 2008 crisis considerably shortened their relative share in the structure of the GVA formation; the output volume in the region in 2009, in comparison with the previous year, decreased by 31.4% in mechanical engineering sector, in metallurgy – by 22.4%, in pulp and paper production – by 14.9%, in woodworking – by 7.8%, and there are no signs of post-crisis recovery in the industry. However, the 2013–2014 crisis was less severe, and the process manufacturing productions managed

Table 2. Quantitative indicators of structural changes in the sectoral structure of the GVA formation in the Vologda Oblast's economy*

Sector	Magnitude of the structural shift, p.p.						Index of the structural shift, p.p.					
	2005-2007	2008-2009	2010-2012	2013-2014	2015-2018	2005-2018	2005-2007	2008-2009	2010-2012	2013-2014	2015-2018	2005-2018
Process manufacturing	-0.6	-13.4	-2.0	1.6	3.4	-4.2	0.0	-0.3	-0.1	0.0	0.1	-0.1
Transport and communications	-2.5	3.6	-0.5	-0.4	-4.0	1.1	-0.2	0.4	0.0	0.0	-0.2	0.1
Wholesale and retail trade	1.3	1.0	0.9	0.5	0.3	5.6	0.2	0.1	0.1	0.0	0.0	0.8
Construction	-0.6	0.3	4.3	-0.5	1.8	-3.8	-0.1	0.0	0.5	-0.1	0.4	-0.4
Real estate operations	0.3	0.2	0.3	-0.4	0.1	1.8	0.1	0.0	0.1	-0.1	0.0	0.5
Public administration	1.9	2.7	0.4	-0.4	-0.7	2.3	0.8	0.6	0.1	-0.1	-0.1	1.0
Agricultural industry	-0.8	0.8	-1.9	0.6	-0.4	-3.4	-0.1	0.1	-0.3	0.1	-0.1	-0.5
Healthcare	0.5	1.4	-0.2	-0.1	-0.2	0.3	0.2	0.4	0.0	0.0	-0.1	0.1
Energy, gas, and water production	-0.1	1.6	-0.9	-0.4	-0.2	0.0	0.0	0.5	-0.2	-0.1	-0.1	0.0
Education	0.2	1.1	-0.5	-0.2	0.0	0.1	0.1	0.5	-0.2	-0.1	0.0	0.0
Sector	**Velocity of the structural analysis, p.p. per year**						**Power of the structural shift, p.p.**					
	2005-2007	2008-2009	2010-2012	2013-2014	2015-2018	2005-2018	2005-2007	2008-2009	2010-2012	2013-2014	2015-2018	2005-2018
Process manufacturing	-0.2	-6.7	-0.7	0.8	0.9	-0.3	-0.2	-6.7	-0.7	0.8	0.9	-0.3
Transport and communications	-0.8	1.8	-0.2	-0.2	-1.0	0.1	-0.8	1.8	-0.2	-0.2	-1.0	0.1
Wholesale and retail trade	0.4	0.5	0.3	0.3	0.1	0.4	0.4	0.5	0.3	0.3	0.1	0.4
Construction	-0.2	0.2	1.4	-0.3	0.5	-0.3	-0.2	0.2	1.4	-0.3	0.5	-0.3
Real estate operations	0.1	0.1	0.1	-0.2	0.0	0.1	0.1	0.1	0.1	-0.2	0.0	0.1
Public administration	0.6	1.4	0.1	-0.2	-0.2	0.2	0.6	1.4	0.1	-0.2	-0.2	0.2
Agricultural industry	-0.3	0.4	-0.6	0.3	-0.1	-0.3	-0.3	0.4	-0.6	0.3	-0.1	-0.3
Healthcare	0.2	0.7	-0.1	0.0	0.0	0.0	0.2	0.7	-0.1	0.0	0.0	0.0
Energy, gas, and water production	0.0	0.8	-0.3	-0.2	-0.1	0.0	0.0	0.8	-0.3	-0.2	-0.1	0.0
Education	0.1	0.6	-0.2	-0.1	0.0	0.0	0.1	0.6	-0.2	-0.1	0.0	0.0

* We consider the ongoing structural shifts in the sectoral proportions of the Vologda Oblast's economy taking into account the sign of the structural shift's mass; so the sign "+" means a positive shift. At the same time, its impact on the region's economy may be different.
Source: own calculation.

to overcome the 2009 level. However, the share of industry in the GVA for 2005–2018 significantly decreased in general, average annual decline rates were 0.32 p. p. per year. During a weak diversification of the Vologda Oblast's economy, this trend is dangerous in terms of the decline of the population's real income and budget revenues, reduction of the living standards and economic growth.

The negative shift in the construction sector is caused by a decrease of effective demand for housing during an unfavorable global economic situation. At the same time, in the post-crisis period of 2009–2012, with a reduction in the commissioning of residential buildings, the relative share of the construction in the economy increased.

We should also pay attention to the negative processes taking place in agriculture. Despite the fact that this sector is declared one of the priorities of the economic policy of the Vologda Oblast and the area of the diversification of the region's industry structure, this type of economic activity has a negative value of the shift's magnitude for most of the studied period. The industry stagnates, and the production output declines every year.

One of the main problems of negative structural changes is the need to modernize the fixed capital of the manufacturing sector. This is also shown by structural imbalances between the commodity production and service sectors. To eliminate them, as well as to improve the production base, it is necessary to attract significant capital investments.

Positive shifts are recorded in the wholesale and retail trade, but it is a consequence of other sectors having faster negative dynamics than trade in crisis periods. However, there is also a contribution of the turnover growth of the retail trade. At the same time, during crisis periods, the service sector significantly expanded its share in the GVA production, responding more mildly to the unfavorable macro-economic situation. However, in the post-crisis periods, the commodity production sector begins to catch up with the pre-crisis development levels due to anti-crisis management measures; the service sector reduces its share in the value added produced (in 2012–2009, the mass shift is negative for most types of economic activities providing services).

The positive shift in the share of transports and communications sector in the GVA is defined by the fact that large infrastructural projects of federal companies create a significant share of the value added formation (PJSC Gazprom, JSCo "RZD", PJSC FGC UES, and PJSC "IDGC North-West"). Due to the stagnation of the industry, a significant share of the economy of the region and the country is made up of companies exporting raw materials, which actively increase their transport and communication capacities.

The most prominent changes, according to the calculated index of structural shifts, occurred in the share of the public administration, wholesale and retail trade, and agriculture sectors. The activity of such fluctuations is more of a result of the dynamics of other types of economic activity than active structural changes within the industry. Big "players" of the regional economy have less significant fluctuations in the proportions of the national economy.

The average annual rate of structural changes is clearly dependent on the phase of economic dynamics. During the 2008–2009 crisis, the rate of changes in the proportions of the national economy increases markedly compared to the rate of changes during the economic growth or recovery. At the same time, the 2013–2014 crisis did not significantly affect structural changes. This is also indicated by data

on the power of structural shifts in the sectoral structure of the GVA formation in the Vologda Oblast's economy.

Calculation of the metric of the impact of structural changes on the dynamics of GRP at different phases of the economic cycle showed that changes in the power of structural changes and sharp changes in the impact of the structural factor on economic growth occur at the time of a crisis – such points are 2008 and 2013 (*Fig. 3*).

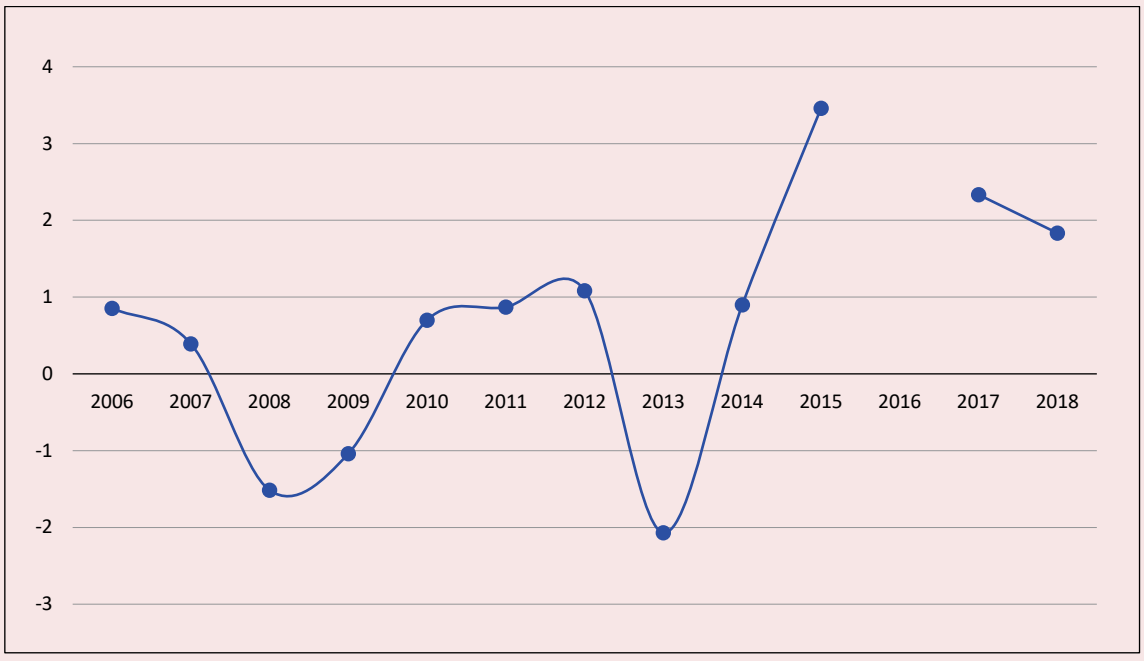
This behavior of the calculated indicator can serve as an indicator for predicting possible significant changes in the functioning of the national economy. However, a complete and objective modeling of the economy's behavior, depending on structural changes, requires a much broader set of indices and metrics, as well as a comprehensive analysis of structural changes in the economy based not only on the analysis of the industry structure but also the structure of prices and costs, demand and income.

Conclusion

In 2005–2018, the sectoral structure of the Vologda Oblast's economy had noticeable and heterogeneous structural shifts mostly caused by economic crises and their consequences. These changes have major consequences for economic and social spheres. Their impact led to a decline of the investment activity in the leading sectors of the economy, which will also affect fluctuations of the economic growth levels.

Adverse prospect can be the increase of the share of the service sector without a secured production basis on the background of the reduction of the impact of the manufacturing

Figure 3. Dynamics of changes in the contribution of structural changes to the dynamics of changes in GRP for 2006–2018, p.p.



The value of the calculated metric for 2016 differs by its magnitude and introduces distortions in the graph.
Source: own calculation.

sector on the regional economy due to uncompensated obsolescence of fixed capitals. The commodity production sector reduces its share in the economy because of negative shifts in agriculture among other things. There is a noticeable impact of the manufacturing industry's state on the growth rate of the region's gross product due to a weak diversification of the economy.

All these deformations affect the level of the Oblast's economic growth and its competitiveness as an entity of the national and world economy. Without managed structural transformations, there will be fewer opportunities to include the Vologda Oblast in interregional and international production value added chains in the future. Therefore, structural policy measures should be aimed at eliminating sectoral imbalances and increasing economic diversification, including vertical one.

The flexibility of regional structural policy, based on a differentiated approach to entities of the Russian Federation, should be an important step toward the formation of a sustainable regional economy. Structural policy at the sub-federal level is more efficient due to the proximity of regional authorities to companies, especially small- and medium-sized businesses [2].

The regional authorities apply specific control measures in these areas of the structural economic policy. They pay a lot of special attention to the diversification of the Oblast's economy. This idea was first mentioned in the Concept of the Strategy (2004) and then in the Socio-Economic Development Strategy of the Oblast (2010 and 2016). The purpose of the region's development was the preservation of people, and the family policy, public healthcare, development of physical culture, sports, education, etc. were the priorities.

Currently, the main document, which defines the structural policy in the Vologda Oblast, is the "Socio-economic development strategy of the Vologda Oblast until 2030"[4]. This document set the structural policy in the region too. However, due to the absence of a clear division between macro-economic and structural policy, standard events of the former may neutralize the latter [28]. This provision should be considered by regional authorities while making operational and tactical decisions, as well as in strategic planning.

Structural policy optimization, based on the results of the analysis, should be carried out in the following areas:

1. Promotion of modernization and diversification in the production sector in order to form the industry framework of the region's economy.

The promising sectors, which could be highlighted by the structural policy, may include agro-industrial complex (in particular, agriculture), electronics, and mechanical engineering. In addition to economic diversification and structural changes, these industries contribute to national security and spatial development in rural and urban areas.

Despite one of the macro-economic policy priorities, announced in the Strategy, being the complication of the economy's structure – support for agriculture, forestry, and food production in particular, their growth rates are insufficient and even negative in case of the agro-industrial complex. The food industry, existing in the region, can provide a stable demand for crop and livestock products, which indicates a significant potential for stimulating the development of agriculture. In addition, this type of economic activity is named one of the

[4] On the socio-economic development strategy of the Vologda Oblast until 2030: Decree of the Government of the Vologda Oblast no.920 (ed. August 10, 2020), dated October 17, 2016.

most promising sectors – a tool for integrating the Russian economy into the global one [26]. At the same time, Vologda products of the agro-industrial complex can compete with many world leaders.

A significant contribution to the economic growth can be made by more active mechanical engineering and electronics. These knowledge-intensive industries with high value added are significant tools of import substitution policy, and their development will contribute to a deeper integration of the regional economy into global value chains.

According to our calculations, the activation of these industries has a significant multiplicative effect. So, each ruble of demand for agricultural products will create 2.064 rubles of GRP, electronics products will bring 2.368 rubles, and mechanical engineering – 2.758 rubles. For comparison, the same multiplier in mining is equal to 1.7 rubles per ruble of demand for products and 1.495 rubles for financial services [27].

2. Development of structural and investment policy within the strategic planning.

The necessity to manage investment aspects of structural economic transformations is caused by a number of existing problems in the economy: significant obsolescence of fixed capital and the need for their modernization, low innovation activity and investment "hunger" due to an insufficiently high norm of gross accumulation of fixed capital [4].

It is necessary to create a mechanism for the redistribution of investment resources from the export-raw materials sector, improve the means of converting savings into gross savings, and reduce the withdrawal of capital from the region to offshores. It is also important to attract budget investments that could become the engine of the investment process in the region's economy [29]. It also makes sense to increase the investment attractiveness of the Vologda Oblast for Russian and foreign investors. Given the acute problem of low innovation activity, it will be important to provide investment support for science and education, which will increase the economy's technological and human resources potential.

3. Formation of a benchmarking system for monitoring the effectiveness of structural policy measures.

Due to the aforementioned problem of a lack of a clear division between regional economic and structural policies, it will be important to create a system for benchmarking the conducted structural policy in order to track its effectiveness and make adjustments if necessary. At the same time, the assessment should be independent, and external auditors should be involved. It makes sense to exchange experience with other regions and countries to select the best mechanisms for implementing structural policies.

Besides, the benchmarking system includes not just key points of the structural policy results (like KPI and BSS5 already applied in management, including public management) but assessment of the best existing practices of regional administration of structural economic transformation and opportunities for their adaptation to a benchmarking object. However, it is currently impossible to objectively determine the criteria for such a system of evaluating structural policy measures.

The following studies will be related to the identification of structural shifts' dependence in the formation of gross value added on proportions of investment distribution in fixed capital within the regional economy sectors, as well as to conducting the factor analysis of the impact of changes in sectoral proportions on

[5] KPI – Key Performance Indicators, BSS – Balanced Scorecard System.

the economic growth. The limitations of our research include insufficient development of a criteria system that allows the structural policy benchmarking.

The study of changes of the national economy proportions gives an opportunity to adjust models considering the structural factor's impact. It is achievable within the work on the modelling and designing interregional value added chains on the basis of the inter-sectoral balance methodology. Consequently, it defines the organization of such studies regarding regions-partners of the Vologda Oblast in value added chains. Moreover, one of the points of scientific novelty is the approbation of the research methodology concerning the contribution of structural shifts in the regional economic growth.

Scientific novelty of the study, substantiating its contribution in the scientific advancement, is the disclosure of current trends in the processes of the economic industrial structure transformation at different phases of economic dynamics. The practical significance of the study is to provide analytical conclusions for regional authorities in order to form efficient structural policy measures to ensure the region's economic growth and sustainable development.

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Received November 26, 2020.

DOI: 10.15838/esc.2020.6.72.11
UDC 331.56, LBC 65.05

Assessment of the Reaction of Cyclical Unemployment to the Economic Decline and Recovery Growth in Russia*

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Abstract. The purpose of the research is to conduct the econometric modeling of the interconnection between changes of the output and unemployment levels in Russia by disaggregating the periods of the decline and economic growth. Research methods are based on a modified Okun's model which reflects

* The reported study was funded by RFBR, grant no. 20-010-00681.
For citation: Blinova T.V., Rusanovskii V.A., Markov V.A. Assessment of the reaction of cyclical unemployment to the economic decline and recovery growth in Russia. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 184–198. DOI: 10.15838/esc.2020.6.72.11

the impact of changes in the output volumes on the dynamics of the unemployment level. The sample includes 79 Russian regions and uses annual (2000–2019) and quarterly (2010–2019) data. The results obtained showed that the Okun's coefficient is negative in each studied specification, which corresponds to the theoretical content of the interaction between macro-economic parameters. Middle-term (2010–2019) values of the Okun's coefficient (–0.105) are acquired on the basis of the Generalized Linear Model assessments, which is free from perturbations associated with quarterly parameter fluctuations. The Okun's coefficient value, calculated according to quarterly data, is around –0.05. We statistically analyzed the "asymmetry effects" on the labor market during the economic decline and recovery growth on the basis of annual data (2000–2019). Assessments of the econometric models showed that the Okun's coefficient displays stronger reaction of the unemployment to the decline (–0.167) in comparison with the recovery growth (–0.090). The novelty of the research results is related to the construction of the econometric models reflecting the impact of changes in the output models on the dynamics of the unemployment level in Russia in 2000–2019 and disaggregated periods of the economic decline and recovery growth. The following development of this research will be related to the assessment of the impact of the economic recession on the unemployment level in Russian regions. The results may be used for conducting anti-crisis policy in the labor market during the economic recession.

Key words: Okun's model, unemployment level, cyclical decline, economic growth.

Introduction

The interconnection between changes in the output volumes and unemployment rate is one of the most important aspects in the system of macro-economic interactions. The fundamental basis for studying the impact of the output decline on rising unemployment is the Okun's law, which measures the cyclical response to economic shocks. The negative macro-economic interdependence between the unemployment rate and growth (decline) of the output, described by Okun, reflects the reaction of the cyclical unemployment to cyclical economic changes in the country [1]. The literature also discusses the inverse relationship for assessing the potential reserves of the economic growth and achieving "full employment" or determining the risks and scale of the output reduction when the unemployment rate increases. It should be noted that the Okun's original model was originally intended to assess the potential gross national product under the condition of the full employment, which ensures a maximum possible usage of labor and capital resources with a target unemployment rate of 4% [1]. Average estimates, made for 1947–1960, showed that an additional percentage point above the target unemployment rate means nearly a 3% decrease in actual GNP [1]. For the interconnection of the macro-parameters, studied in this article, another conclusion of the author is important: namely, an assumption that, in periods when the economic growth exceeds 2.25%, a 1% increase of the real output leads to the decrease in the unemployment rate by 0.5% [1].

The scientific literature presents and discusses the values of the Okun's coefficient differentiated by a country, which reflects the institutional, economic, social, and cultural features of the national labor market development [2–12]. Different authors compared the effect of the Okun's law in developed and developing economies. The estimates obtained showed that, on average, the Okun's coefficient, which measures a short-term sensitivity of the labor market to fluctuations in the output volume, is about twice as high in developed countries than in developing countries [9]. There are differences

in the time of estimates or, depending on the choice of a studied period, they signal the strength of economic shocks, a degree of sensitivity of labor market indicators, and the cyclical response of the unemployment rate to cyclical changes in the output at different stages of the country's economic development. In addition, it is proved that the estimates are sensitive to the choice of specifications of the Okun's model [10]. However, the most significant differences are noted in the moments when periods of the economic decline and recovery growth are studied within the development of any country's national economy. The behavioral responses of regional and national labor markets to cyclical recession have always interested researchers and decision makers. According to Russian scientists, "in the times of crisis, it is especially important to understand the effect of the output decline on the unemployment rate, since this is one of the most important economic and social indicators" [13, p. 28].

Many researchers emphasize that the Okun's Law provides an understanding of the "cyclical effects "in the "output-unemployment" relationship, theoretically justifying and empirically testing the mechanisms of the interaction between the labor market on the one hand and the market of goods and services on the other. Econometric estimates of the cyclical growth in the unemployment rate are particularly relevant at the time when many countries experience the effects of the coronavirus pandemic, which has led to a reduction in demand for goods and services, a drop in incomes, and staff lay-offs, especially small businesses and services. In addition, experts predict an incoming cyclical economic recession, when the output decline and the unemployment increase will be more significant. The results of our study, conducted using a modified Okun's model, show the dependence of the nature of the "output-unemployment" relationship on the business cycle phase.

The main purpose of the study is to perform a quantitative assessment of the Okun's coefficient, which reflects the relationship between changes in gross domestic product (GDP) and the unemployment rate during periods of the decline and economic growth in Russia. The scientific novelty consists of the theoretical justification and formalized representation of the interaction mechanisms between the unemployment and output during the decline and recovery growth in Russia. The sample includes 79 entities of the Russian Federation, the studied period is from 2000 to 2019, while quarterly data are used for the 2010–2019 period, and the periods of the decline and economic growth are disaggregated.

Theoretical aspects of the research

There are many works in the scientific literature devoted to the empirical analysis of cyclical economic fluctuations, which analyze the behavior of labor market indicators. For example, A. Evans evaluated the impact of changes in the output on the dynamics of the unemployment rate with a case study of the Australian economy. In his work, the sensitivity of the "unemployment gap" to the "output gap" was interpreted as a measure of the Okun's coefficient [14]. A. Evans separated the cycle and trend by the unemployment rate and the logarithm of actual gross domestic product (GDP), and the cyclical components were interpreted in terms of the output and unemployment gaps. The methodology of the decomposition of the trend and cycle led to the overestimation of the absolute assessments of the Okun's coefficient that drew special attention. However, this allowed us to differentiate the values of the Okun's coefficient by age and gender and conclude that middle-aged men participate in the labor force throughout the business cycle, while women's participation is pro-cyclical [14].

For the Russian economy, scientists of the Institute of Economic Forecasting were among the first researchers who studied the relationship between changes in the output and unemployment rate using the Okun's model, revealing the features of its indication in the Russian labor market. The calculations made it possible to conclude that a short-term "increase of the output by 1% leads to the decrease in the unemployment rate by approximately 0.06% within three quarters after the occurrence of the initial change" [15]. Studies have shown that the values of the Okun's coefficient depend not only on the state of the economy in different countries but also on the evaluation period, as well as the sample size. Thus, the authors noted that, before 2000, a medium-term Okun's coefficient in Russia was lower by a module (–0.12) than after 2000 (–0.25), when "a 1% increase in real GDP led to the reduction in the unemployment rate by a quarter of a percent", showing a higher sensitivity [15, p. 494]. At the same time, attention was focused on a lack of an instant reaction of the unemployment to the output changes. As a result, scientists conclude that the studied macro-parameters show high inertia, and they largely depend on their past values, showing a weak mutual influence. Explaining a low sensitivity of the unemployment to the output changes, the authors note that the adaptation, as a rule, takes place "primarily not due to changes in a number of employees but due to changes in real wages, a number of hours worked, the length of a working week, etc." [15, p. 477].

Other scientists rightly believe that lower values of the Okun's coefficient in Russia "may reflect not just the specifics of the domestic labor market but rather the conditions in which the Russian economy developed during the studied period" [16, pp. 21–22]. In their opinion, and we should agree with it, in Russia, the Okun's law is implemented in the same way as in other countries, but the coefficient values there are lower than in most economically developed countries. The authors believe that differences between countries and time periods are determined not only by labor market institutions that affect a degree of the employees' protection but also by the nature of shocks. The authors' calculations show that the reaction of the labor market to the acceleration of the economic growth by 1% means the unemployment decline by 0.1% in a short-term period, and it also leads to the increase of the decline rate by 0.15% in a medium-term period [16].

Foreign and domestic researchers have tested and repeatedly discussed the hypothesis of an asymmetric response of the unemployment to economic shocks. In particular, estimates of the impact of economic fluctuations on the unemployment rate in the United States in 1947–1999 showed that it was more significant during the decline [11]. A strong link between the economic fluctuations and unemployment during the decline was also revealed by other studies [12]. The Russian authors also obtained data confirming that, during the economic decline, the reaction of the unemployment rate is stronger than during the economic growth. "The Okun's coefficient is significantly higher in the module (–0.18 vs. –0.07) during the decline in growth rates, i.e., during the periods of the output decline, the reaction of the unemployment rate is much greater than during the growth periods" [13, p. 37]. Based on the estimates made, the authors concluded that, in Russia, as well as in foreign countries during the periods of economic declines, the "output-unemployment" relationship increases, but it weakens with the beginning of the growth. However, later, when scientists analyzed the impact of interregional mobility on the interaction of the gross regional product (GRP) and the unemployment rate in the regions of the Russian Federation, no

differences were revealed. On the contrary, calculations have shown that the asymmetry of the adjustment of the unemployment rate to the growth and decline of the GRP does not appear if spatial interactions are considered [13]. In addition, it was concluded that "without taking into account spatial effects, the values of the Okun's coefficient for regional data are underestimated" [13, p. 30]. Econometric estimates of the Okun's model were performed not only for Russia but also for other CIS countries, and calculations showed that the increase of the quarterly GDP growth rate by 1% is associated with the decrease in the unemployment rate in Russia by 0.06% in comparison with the previous quarter, in Ukraine – by 0.05%, in Belarus – by 0.0057%, and in Kazakhstan – by 0.0073 [17; 18].

The Okun's coefficients for 1985–2013 from 20 OECD countries, which considered the impact of labor market institutions and demographic factors, are of the scientific interest. The results obtained indicate that the Okun's coefficient differs for all studied age groups, and it decreases with increasing age [19]. Based on this, it was concluded that the stimulation of the economic growth will lead not only to the increase of the overall level of employment but also to a significant reduction of youth unemployment. The study considered time-varying equilibrium unemployment rates, and it was able to record changes in the value of the Okun's coefficient over time [19]. The position of young people on the labor market of European countries during the "Great Recession" (2007–2009) and the role of institutions that determine cross-country differences are also studied by other scientists. Using the Okun's model, the work [20] identified the features of short-term relationships between the economic growth and indicators of the youth labor market. The only difference was that the key dependent variable was the employment level and not the unemployment level as in most works [20]. Another point of view is presented in the literature, according to which the "Okun's Law is only an approximation to the actual ratio between the domestic output and unemployment, since it does not take into account the impact of other factors on the relationship of these variables" [21, p. 84]. The authors are convinced that, since the values of the Okun's coefficient differ by country and vary from one period to another, they cannot be considered universal [21, p. 84].

Thus, summarizing different positions of scientists, we can conclude that the Okun's Law is valid in most countries, including Russia. The theoretical assumptions and hypotheses of the Okun's model explain important relationships between macro-parameters, but the estimates are sensitive to the characteristics of national labor markets, the nature and strength of economic shocks, and the choice of econometric models. Our research also shows the sensitivity of estimates to the phases of the business cycle.

Research methods and database

Models of the unemployment's dependence on the business-cycle. The effect of the growth and decline of the output on the change of the unemployment is analyzed from the standpoint of the aggregate demand expansion which motivates the growth of the output, which in turn increases the demand for labor improving employment and reducing unemployment. At the same time, the decline in production reduces the demand for labor, reducing the level of employment and creating prerequisites for the unemployment increase. In other words, the "output-unemployment" relationship is inverse, and the regression coefficient always has a negative sign. As previously noted, the negative relationship between changes in output and the dynamics of the unemployment rate was described and empirically investigated by the American economist Arthur Okun (Okun,

1962). In order to understand the specifics of the operation of the Okun's Law in the Russian economy and to assess the specifics of behavioral responses of labor market indicators to economic fluctuations, our study used a modified Okun's model, which has been used by many scientists at various times [20].

Database. A panel sample was formed, and it includes 79 out of 85 Russian regions: data were obtained for 2000–2019. Indicators that characterize the labor market and changes in the economy of the autonomous okrugs (Nenets, Yamalo-Nenets, Khanty-Mansi) are considered in the corresponding regions of the country (*Tab. 1*).

The Republic of Crimea and Sevastopol are not included due to the lack of data until 2014, and the Chechen Republic – due to the lack of data until 2007. The foundation of the information basis of the study was the data presented on the official Rosstat website, including, first, the unemployment numbers and its level measured by the methodology of the International Labor Organization (ILO)[1], and, second, the gross regional product (GRP) and gross domestic product (GDP), which correspond to the system of national accounts (SNA)[2]. The studied period includes 2000–2019 for annual data and 2010–2019 – for quarterly data. The dynamics of the gross domestic product (GDP) and gross regional product (GRP) were determined on the basis of physical output indices taken in annual and quarterly terms for the same periods as the unemployment rate. The change of the output was estimated based on the calculation of the chain growth indices. For annual data, the indices are obtained by multiplying quarterly values, and they show the growth rate of the output relative to the previous year. It should be considered that the Russian labor market is highly heterogeneous [22–24], interregional differences decrease during the crisis and increase within the economic growth.

Results of the research

Analysis of the relationship between changes of the output and unemployment. The analysis of empirical data for 2000–2019, reflecting economic fluctuations and related changes of the labor market, show a non-linear correlation and complex mutual impact of the unemployment and output. *Figure 1* presents average annual output growth rates in comparison with unemployment fluctuations in Russia. It is clear that the intensity of these processes varies, and the spikes or declines of the output do not visually correlate with changes of the unemployment rate, which is characterized by a steady decline trend in the 2000–2007 and 2010–2019 periods with a slight increase that continued from the second half of 2014 to the first quarter of 2016.

Considering an accumulated dynamic for 2000–2019, it is noticeable that the economic growth (G) was accompanied by a gradual unemployment decrease (U). To reveal the cyclical dynamics of the unemployment rate and output, as well as to search for their interdependencies, quarterly details for 2010–2019 are considered. The following two graphs show the dynamics of the output and unemployment on different axes: the output growth rate scale is located on the left Y-axis, and the change in the unemployment rate is located on the right Y-axis.

As we see in *figures 2 and 3*, extreme points in the output dynamics – growth and decline – accompany similar fluctuations in the unemployment rate. Often, there is no lag reflecting the unemployment delay, and the fluctuations fit into the same quarter. At the same time, starting from 2015, the increase of the

[1] Unified Interdepartmental Statistical Information System. Unemployment level (according to the ILO methodology). Available at: https://www.fedstat.ru/indicator/43062# (accessed: March 15, 2020).

[2] Unified Interdepartmental Statistical Information System. Output index (operative data). Available at: https://www.fedstat.ru/indicator/43048# (accessed: March 15, 2020).

Table 1. Composition of the RF studied regions, unemployment level (U), output growth (G), 2019

Region	U, %	G, %	Region	U, %	G, %
Adygea	8.2	73.5	Perm Krai	5.2	78.2
Altai Krai	5.9	93.4	Primorsky Krai	5.2	97.9
Amur Oblast	5.4	105.3	Pskov Oblast	5.1	81.0
Arkhangelsk Oblast	6.3	42.8	Altai Republic	11.0	91.5
Astrakhan Oblast	7.6	95.9	Republic of Bashkortostan	4.4	84.6
Belgorod Oblast	3.9	104.6	Republic of Buryatia	9.2	60.9
Bryansk Oblast	3.8	86.1	Republic of Dagestan	13.0	116.1
Vladimir Oblast	4.0	100.3	Republic of Ingushetia	26.8	81.8
Volgograd Oblast	5.3	73.9	Republic of Kalmykia	9.2	75.0
Vologda Oblast	4.5	97.9	Republic of Karelia	7.5	109.6
Voronezh Oblast	3.6	104.0	Komi Republic	6.8	77.2
Jewish AO	6.2	125.5	Mari El Republic	4.6	97.9
Zabaykalsky Krai	8.9	80.9	Republic of Mordovia	4.2	137.6
Ivanovo Oblast	3.8	90.4	Republic of Sakha	7.2	106.3
Irkutsk Oblast	6.6	83.3	Tyva Republic	12.4	104.3
Kabardino-Balkaria	10.8	91.9	Republic of Khakassia	6.0	101.1
Kaliningrad Oblast	4.5	114.6	Rostov Oblast	4.8	60.5
Kaluga Oblast	3.7	105.5	Republic of North Ossetia – Alania	12.2	89.5
Kamchatka Krai	3.8	67.3	Ryazan Oblast	4.0	92.8
Karachay-Cherkess Republic	11.8	84.4	Samara Oblast	3.9	90.2
Kemerovo Oblast – Kuzbass	5.5	91.8	Saint Petersburg	1.4	115.9
Kirov Oblast	4.8	96.0	Saratov Oblast	4.4	84.1
Kostroma Oblast	4.1	88.4	Sakhalin Oblast	5.2	96.5
Krasnodar Krai	4.8	98.9	Sverdlovsk Oblast	4.2	95.5
Krasnoyarsk Krai	4.5	91.0	Smolensk Oblast	5.3	88.1
Kurgan Oblast	7.8	54.9	Stavropol Krai	4.9	94.2
Kursk Oblast	4.0	99.5	Tambov Oblast	3.9	123.3
Leningrad Oblast	3.9	107.3	Tatarstan	3.3	88.6
Lipetsk Oblast	3.7	100.6	Tver Oblast	4.0	83.2
Magadan Oblast	4.6	118.6	Tomsk Oblast	5.5	94.1
Moscow	1.4	141.3	Tula Oblast	3.8	104.7
Moscow Oblast	2.7	129.6	Tyumen Oblast	3.0	107.7
Murmansk Oblast	5.5	93.6	Udmurt Republic	4.3	76.7
Nizhny Novgorod Oblast	4.1	78.9	Ulyanovsk Oblast	3.8	75.8
Novgorod Oblast	3.7	85.4	Khabarovsk Krai	3.8	33.1
Novosibirsk Oblast	6.1	111.8	Chelyabinsk Oblast	5.1	88.1
Omsk Oblast	6.5	109.2	Chuvash Republic	4.7	94.4
Orenburg Oblast	4.4	90.8	Chukotka AO	3.8	97.2
Oryol Oblast	5.4	99.5	Yaroslavl Oblast	5.4	138.1
Penza Oblast	4.3				

Source: Rosstat data.

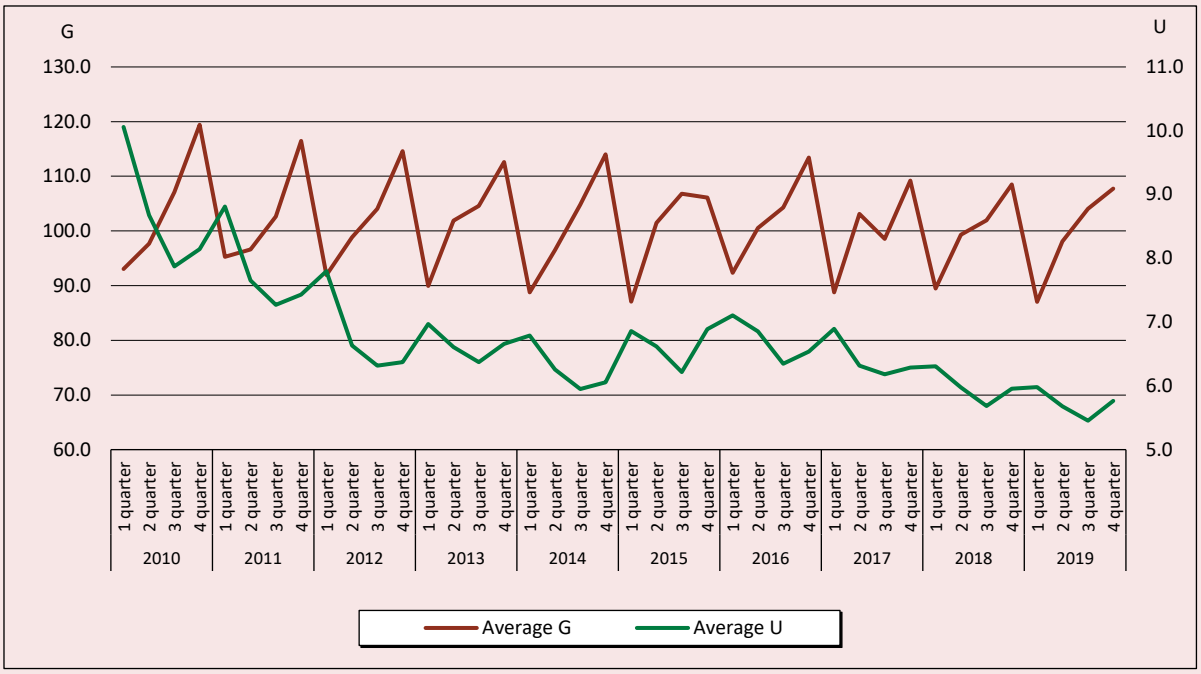
unemployment rate occurs not in the most acute phase of the output decline but earlier – in the previous quarter.

Assessments of the Okun's model. Using the Okun's Law which shows the negative connection between changes of the unemployment level and GDP growth rates, we compare the availability and strength of the labor market sensitivity to the business cycle [25]. There are several versions of the Okun's model including dynamic ones [26]. We apply the modified Okun's model for the analysis of the sensitivity

Figure 1. Average annual growth rate of the output (G) and unemployment level (U) calculated as the sample average, 2000–2019

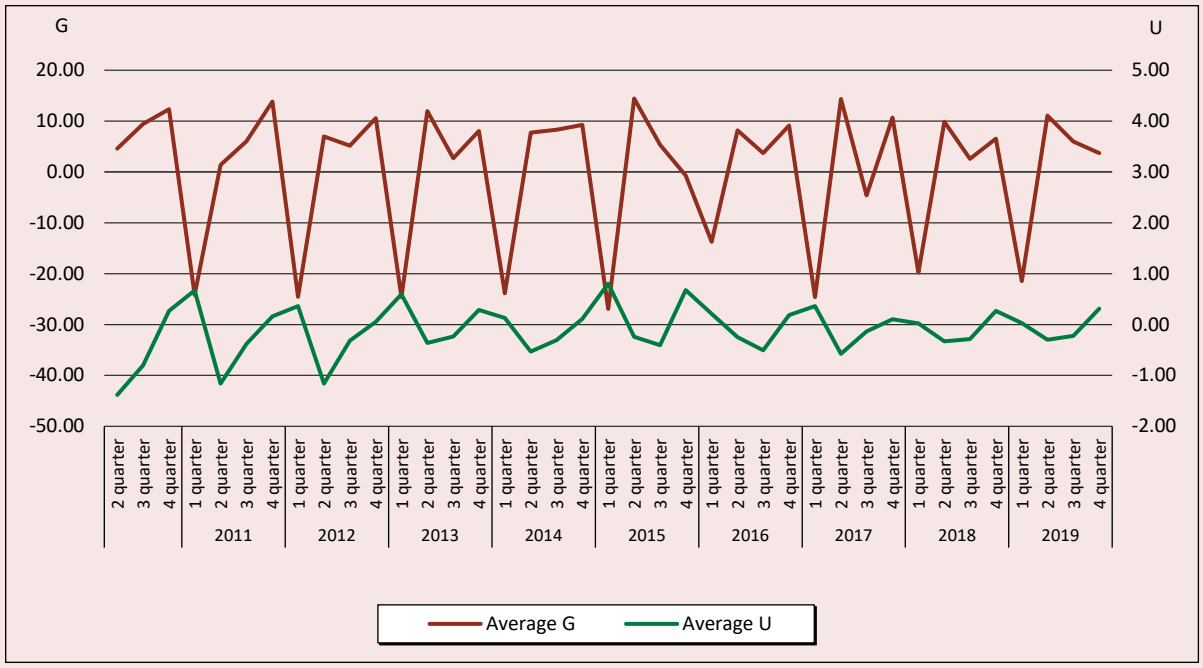
Source: Rosstat data.

Figure 2. Accumulated quarterly dynamics of the output growth rate (G) and the unemployment rate (U) on average for the sample, 2010–2019



Source: Rosstat data.

Figure 3. Fluctuations of the unemployment level (dU) and the output growth rates (dG) by quarters, 2010–2019



Source: Rosstat data.

of the unemployment level to changes of the output growth rates in Russia using the sample with 79 regions.

$$\ln(U_{it}) = a + \beta \ln(G_{it}) + e, \qquad (1)$$

where U_{it} – unemployment level in i region and t year, G_{it} – output growth rate (chain index) in i region and t year; β_i – the Okun's coefficient, which must have a negative value, in other words, the output decline is accompanied by the unemployment rate increase; a – dimension parameter to be evaluated. We can assess this model using the ordinary least squares method (OLS).

In accordance with the tasks set, the model's specifications for the country are evaluated using quarterly data in the medium-term period (2010–2019). The effects of the time and region are included in the model as dummy variables. This makes it possible to control the presence of global shocks common to all regions. We compared three models: one with fixed effects of regions (model 1); one with random effects of regions (model 2); one with fixed effects of periods (model 3). Panel regression was constructed using quarterly data (*Tab. 2*), a dependent variable is in the logarithmic form (*InU*).

Each studied model had a negative Okun's coefficient, which proves an inverse relationship of the output growth and unemployment rate.

While choosing between models with fixed or random effects, we learned that Okun's coefficients are relevant in both cases. However, the model with fixed effects of regions (model 1) has the highest determination coefficient, which is 0.819, and it is equal to 0.845 if we consider spatial effects of regions. The econometric assessment of the quality of model 2 with random effects shows low significance according to the Fisher's criterion and the determination coefficient. The quality

Table 2. Results of the panel regression assessment with quarterly data, 2010–2019

Parameters	Model 1		Model 2		Model 3	
Variables	*a*	*lnG*	*a*	*lnG*	*a*	*lnG*
β coefficients	2.021	–0.050	2.055	–0.058	2.108	–0.069
Standard errors	0.067	0.015	0.097	0.018	0.162	0.033
t-statistics	30.065	–3.440	21.125	–3.123	13.014	–2.055
p-values	0.000	0.001	0.000	0.002	0.000	0.040
R^2(determination coefficients)	0.819		0.003		0.090	
Corrected R^2	0.815		0.003		0.079	
F-statistics	213.06		9.75		7.74	
Weighted statistics	0.845		–		0.090	
Unweighted statistics	0.819		–		0.082	
Source: Rosstat data.						

assessment of model 3 is also unsatisfactory. The results of the Hausman specification test confirmed that, with any specifications, a model with fixed effects is preferable to a model with random effects.

The assessment of the panel regression model with fixed spatial effects and its specification are as follows:

$$lnU = 2{,}02 - 0{,}05lnG + [CX=F]\ . \quad (2)$$

The value of the Okun's coefficient, calculated by quarterly data, is about –0,05. Additionally, confidence intervals were assessed for the Okun's coefficient with a different percentage of error probability in the model.

A relatively low value of the Okun's coefficient could be explained by several reasons. First of all, it is necessary to consider that, along with the growth or decline of the output volumes, the behavior of all labor market indicators changes, which, having different degrees of sensitivity to shocks, adapt to the new economic situation. Thus, the output decline, in addition to rising unemployment, is accompanied by the uneven decrease of the employment level, changes in the labor force participation (economic activity), reduced working hours, delayed payment of wages, declining productivity and real incomes. Russian and foreign authors repeatedly noted that "during the periods when the output growth slows or declines, a mean number of man-hours worked decreases more sharply" [15, p. 474]. "Workweek duration" or "man-hours worked" indicators are more sensitive to the output changes, and their response to a decline is non-linear. In terms of the sensitivity to economic shocks, real wages and a number of working hours outrun the behavioral responses of the unemployment and employment levels, reflecting a non-linear response to shocks. The dependence, empirically proved by Okun, affects only the cyclical relationship between changes of output and unemployment (employment), the behavior of other labor market parameters in the mechanism of adjustment to economic shocks, and it forms scenario conditions. It is also important to emphasize the presence of informal employment and hidden unemployment, which mediate the impact of the output decline on changes in the unemployment rate, affecting the sensitivity of unemployment to economic fluctuations. As researchers note, "the existence of hidden unemployment, output, and employment in the shadow sector leads to distortions in the studied dependence of the GDP dynamics and unemployment rate" [15, p. 484]. However, the impact of the shadow economy, which has been less studied, is difficult to quantify due to the problems of measuring its contribution to the economic growth [18]. To eliminate quarterly fluctuations of the parameters and

possible model distortions associated with them, a panel regression was constructed based on a generalized linear model (Generalized Linear Model) (*Tab. 3*).

Table 3 shows that the assessment of the Okun's coefficient, conducted on the basis of the Generalized Linear Model (GLM), has a higher value (–0.105) than the one acquired before (–0.05). Both assessments are based on quarterly data (2010–2019). However, the GLM-model, first, smooths out quarterly fluctuations that affect the deviation of the data distribution form from the normal one, and, second, it does not take into account individual regional cross-effects. These differences in the estimation of the Okun's coefficient are largely caused by the intra-annual cyclicity of quarterly data, which is smoothed out in the GLM-model. Thus, the estimate of the Okun's coefficient (–0.105), presented in table 4, is more stable and free from disturbances associated with quarterly fluctuations in parameters during the year.

Let us move on to estimating the Okun's coefficient for Russia for sub-periods of the economic decline and recovery growth using annual data.

Assessment of the Okun's coefficient for individual sub-periods of the business cycle. Foreign literature describes asymmetric reactions of the unemployment rate to the economic decline and growth [11; 27–29]. As a result of the econometric analysis, it was revealed that the sensitivity of the unemployment to decline is significantly higher than to the growth, as shown by the values of the Okun's coefficient. In the Russian literature, contradictory assessments are given indicating the presence and absence of asymmetry in the adjustment of the unemployment rate to the decline and growth. In some works, the asymmetry of the adjustment of the unemployment rate to the growth and decline of the GDP is confirmed [15, 16], while it is refuted in others [13]. Adhering to the position of researchers who believe that the Okun's coefficients significantly differ for positive and negative output growth rates, we disaggregated the studied period (2000–2019) into sub-periods that include years of the decline and economic growth. Panel regressions are assessed with the least squares method (OLS), using annual data, and they show a significant mutual dependence between the unemployment rate and economic growth (decline) in each sub-period (*Tab. 4*).

Data of Table 4 prove that the models and the Okun's coefficients are both significant. Assessments of the fixed-effects model show that, during the periods of the economic decline, the Okun's coefficient reflects a stronger dependence of changes in the unemployment rate on the output decline than in the years of the growth. The Okun's coefficient which reflects the dependence of the unemployment on the rate of change in the output during the economic decline is –0.167. At the same time, in the period of the post-crisis growth, there is a weaker sensitivity of the unemployment to economic fluctuations, and the Okun's coefficient is –0.090. However, in both cases, the fixed effects of regional economies significantly affect the nature of the relationship between the unemployment and output.

Table 3. Parameters of the GLM-models with logarithms of variables, 2010–2019 (quarterly data)

Parameters	β coefficients	Stand. errors	z-statistics	Probabilities
a	2.274	0.197	11.560	0.000
lnG	–0.105	0.043	–2.467	0.014
Mean dependent var	1.79	S.D. dependent var		4.71
Akaike info criterion	15.14	Schwarz criterion		15.15
Hannan-Quinn criter	15.14	Pearson statistic		22.07
Source: Rosstat data.				

Table 4. Assessment of the Okun's coefficient for sub-periods based on annual data from Russian regions, 2000–2019

Sub-periods	Decline, G (–)	Growth, G (+)
a (fixed cross-effect of a region)	1.059	1.607
β regression coefficient	–0.167	–0.090
Standard errors	0.03	0.04
t-statistics	–4.74	–2.26
P-significance	0.00	0.02
Durbin-Watson statistics	1.667	0.845
Determination coefficient (weighted statistics)	0.857	0.758
F-statistics	36.019	37.539
Determination coefficients (unweighted statistics)	0.794	0.720
Source: Rosstat data.		

Discussion of the research results

The work theoretically justifies and empirically confirms the dependence of the "output-unemployment" relationship on the business cycle phase. On the basis of the Rosstat data for the sample, including 79 Russian regions, we conducted the quantitative assessment of the Okun's coefficient values, which measures the cyclical reaction of the unemployment level to economic shocks. Studies revealed a lower value (by the module) of the Okun's coefficient in the short-term period compared to the medium term. The 2000–2019 period was disaggregated, and years of the decline and economic growth were highlighted. The results of the econometric modeling showed that the negative dependence of the unemployment rate on output volumes exists in the studies period and selected sub-periods. However, assessments of the values of the Okun's coefficient for sub-periods show a stronger reaction (response) of the unemployment to the output decline than to the recovery growth. In other words, the "asymmetry effect" is confirmed, and it is explained by an absolute sensitivity of the unemployment to the phases of the business cycle, measured using the Okun's coefficient.

The results obtained are consistent with the other authors' data. Thus, analyzing the US economy, researchers revealed that the impact of changes in the output on the unemployment rate was the most significant during the economic decline [11; 12]. Evaluating the Okun's coefficients for nine counties with the transition economy, the researchers determined that, in most countries, cyclical unemployment is more sensitive to the cyclical decline than to the growth [28]. The results showed that the most significant asymmetry is typical for the Czech Republic, Hungary, Latvia, and Russia [28]. In foreign literature, gender and age differences in the Okun's coefficient are recorded, which are caused by a different sensitivity of labor market segments and socio-demographic groups to macroeconomic changes. Thus, the research results show that youth cohorts on the labor market show a stronger reaction to shocks, and, during a recession, they are more vulnerable on the labor market than older people [14]. The asymmetric behavioral response of the cyclical unemployment to the production decline and recovery growth is of particular interest to policy makers [14].

Conducted econometric assessments also confirm the dependence of the nature of the "output-unemployment" relationship on the business cycle phase, when, in the period of the decline and loss of jobs, the response of the unemployment level to economic fluctuations is more significant than during the recovery growth. It is important to note that there are conceptual differences in the interpretation of behavioral responses of the unemployment

rate during the economic decline and recovery growth. Thus, if the response of the unemployment rate to the decline and job losses is strong, which is confirmed by high values of the Okun's coefficient, then the assessment of the response to the recovery growth is insignificant due to the absence (or weak) cyclical response of the unemployment. A low cyclical sensitivity of the unemployment rate to the output growth rates in the first post-crisis years, when the output growth is not accompanied by job creation and increased employment, is explained by the nature of the recovery growth, its fundamental difference from the investment growth. The recovery growth is characterized by high rates, but it is a short-term and fading by its nature, and it does not create additional demand for labor and workers, because it is based on internal resources that remain "in reserve" after the economic downturn. As soon as internal sources are exhausted, the growth fades. Additional demand for workers is provided by the investment growth, when new jobs are created, employment increases, and unemployment decreases. In this regard, the stimulation of investments and creation of a favorable business climate are important components of the mechanism for creating new jobs. An equally important role for a balanced post-crisis growth is played by investments in human capital aimed at developing education, improving health, increasing life expectancy and the quality of life of people. Researchers rightly draw attention to the underestimation of the "human capital as the main factor in the development of the Russian economy at the present stage" [30, p. 57]. The scale of the expansion of demand for labor depends on the economic development model, the degree of the output renewal, the introduction of modern technologies, the volume and structure of investments in human capital.

The unemployment rate is influenced by factors not only from the demand side but also from the supply side of the labor market. Therefore, it should be considered that economic fluctuations explain only a part of the change in the unemployment rate. Other sources of change may be demographic, social, or institutional factors. In particular, shifts in the age structure of the population and the increase in a number of people of working age, which put demographic pressure on the labor market, increase the risks of rising unemployment. Labor migration has an impact on the labor market and fluctuations in the unemployment rate. Changes in the scale of informal employment, the effects of "desperate" and "additional" workers, the entry of people of the retirement age into the labor market, and other factors may have an impact on the unemployment rate which are not taken into account in the Okun's model.

Conclusion

The authors conducted the modeling of the business cycle's impact on the attitude of the national labor market of the Russian Federation. The methodology is based on a modified Okun's model which shows the impact of the change in the output volumes on the dynamics of the unemployment level. The studied period is 2000–2019, and the specifications are evaluated using annual and quarter panel data. We conducted the statistical analysis of the "asymmetry effects" within the economic decline and recovery growth in Russia. The results of the econometric modeling showed that each studied model had a negative Okun's coefficient, which corresponds to the theoretical content of the interaction between macro-economic parameters, reflecting the sensitivity of the unemployment level to changes of the economic growth rates. The Okun's coefficients during the economic decline and growth were compared. The results of the econometric modeling showed that the Okun's coefficient demonstrates a stronger cyclical reaction of the unemployment level (–0.167) during the

economic decline than in the times of the recovery growth (–0.090). The reasons for the absence of the asymmetric cyclical response of the unemployment and its low sensitivity to the post-crisis economic growth, in our opinion, is in the recovery growth, which is based on the "internal reserves", and it has a short-term and fading nature. In other words, the recovery growth is not followed by the creation of jobs, employment increase; it is based on the existing and previously unused resources, and this process does not form an additional demand for the labor force. A growing demand for the labor and employees is caused by the investment increase which extends a number of jobs and the population's employment, lowing the unemployment level. It is important to mention that specific features of regional economies significantly impact the nature of the interconnection between changes in the unemployment level and output dynamics. The following analysis of this research area may be related to the assessment of the impact of the economic recession on the unemployment level among various socio-demographic and gender groups in Russian regions. The most complicated research field may be the analysis of factors and reasons, defining differences of the Okun's coefficient between countries and regions. Data obtained may be used for conducting the anti-crisis policy in the labor market during the economic recession.

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Received May 12, 2020.

DOI: 10.15838/esc.2020.6.72.12
UDC 33, LBC 65.050.2

Human Capital Competencies in High-Tech and Knowledge-Intensive Sectors of the Economy*

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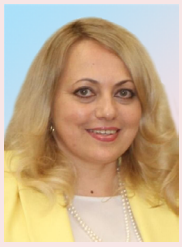

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* The work is based on the results of a budget-funded research carried out by Financial University as part of a state assignment.

For citation: Eskindarov M.A., Gruzina Yu.M., Firsova I.A., Melnichuk M.V. Human capital competencies in high-tech and knowledge-intensive sectors of the economy. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 199–214. DOI: 10.15838/esc.2020.6.72.12

Abstract. Modern society is a knowledge economy. A person who is able to assimilate, analyze, and transform information, received from outside, into knowledge comes to the fore. The requirements for professional and general cultural competencies of the leader's personality are determined by his position in the system of two types of relations: formal ones, due to the power vertical of responsible dependence, and informal ones, related to interpersonal likes and dislikes and intergroup relations in the performance of direct official and public functions. Within the framework of assessing the personal qualities of a leader in high-tech and knowledge-intensive sectors of the economy, there are criteria for indicators and development levels of his/her competence. A successful leader in high-tech and knowledge-intensive sectors of the economy should not only have value-based ideas about the organization of labor and have high professional competencies but also be able to effectively and lawfully manage human capital and know the mechanisms of the labor economy. Knowledge becomes the leading production segment, commodity exchange. In the leading countries, from 75 to 90% of the gross domestic product is created at the expense of scientific and technological progress, research and development work. The mechanism of knowledge production has been launched, which is a combination of fundamental science, universities, business schools, knowledge transfer, information flows, etc. In this regard, a leader of an organization and staff should have formed competencies for working in conditions of quantitative data overload, irrelevant and blurry information, information and emotional overload. Effective management style of a leader involves the formation of competencies for localization of information pressure, which is aimed at developing information culture in the organization. Our purpose is to determine the dominant characteristics of the qualities of a leader – a manager, working in the field of high-tech and knowledge-intensive industries, to develop a model of the formation and development of competences of a leader in the field of human capital management in the process of his professional activity, as well as the model of the leadership institute development. The authors adhere to the basic idea of the need to analyze abilities, knowledge, and skills, acquired and formed at an university, and to assess general professional and personal qualities of graduates that are required by employers. The main applied methods include desk and sociological research based on systematic and integrative approaches.

Key words: human capital, leadership, high-tech and knowledge-intensive sector of the economy, leadership competencies, human capital management.

Introduction

Modern society is characterized, first of all, by a key development of high technologies. Its distinguishing feature is a high level of expenditures on research, developments, and human capital advancement. In this regard, organizations and the labor market place high demands on human capital [1–5], specifically: a high level of technical knowledge, skills, and competencies for the implementation of business processes and innovation activities; a high level of business training for the implementation of innovative projects; creativity and professional skills for producing innovative goods and technologies; an ability to work in a team; technical knowledge and skills as the main element of innovation development at an enterprise to increase its competitiveness; innovative activity as a key quality of innovation development; an ability to make quick non-standard decisions.

A starting point of effective management of an organization in high-tech and knowledge-intensive sectors of the economy, according to HR services, is the determination and

functioning of a new type of leaders – ones with digital competencies and team-oriented skills [6–10]. 48% of companies-leaders in this sphere note that investments in human capital have been a key element of the income growth over the last two reporting periods. For example, in IT technologies, the website of the international consulting company IDC contains a six-step structure that makes it possible to determine the development level of digital leadership of organizations in high-tech sectors of the economy. The criteria for drawing a conclusion separately assess activities of IT and project officers (CDO – Chief Digital Officer). Market development forces leaders to find new ways of attracting new digital talents – digital developers, database researchers, UX (User Experience) and UI (User Interface) experts, as well as design consultants [11]. These personnel will help an organization to quickly and effectively turn the usage of digital data into digital opportunities for bringing profit. This is confirmed by SAP (System Analysis and Program Development) research: currently, leading companies are much more likely to create previously non-existent vacancies that are necessary for taking a leading position in a competitive market. Deloitte has developed a digital maturity model that provides a unique opportunity to determine the level of leadership development in organizations.

The formation of new technological structures (fifth and sixth) acts as a springboard in emergence and development of new specialties. Global trends in the knowledge-intensive product market are presented in *table 1*.

Organizations adapt to changes in the labor market and the economy, which entails the need to form new competencies, modern qualifications that meet the requirements of environment and, consequently, human capital development [12; 13]. In modern Russia, the most competitive areas of export of high-tech goods are non-electronic machines, equipment for electric and nuclear power plants.

Thus, the article explores approaches to the assessment of the development of a leader's key competences and suggests recommendations for their formation in the sphere of managing human capital in high-tech and knowledge-intensive economic sectors (telecommunications, automotive manufacturing, medicine, computer equipment production, business manufacturing, pharmacology, chemical, aerospace, and defense industries). The qualities of a leader are characterized on the basis of a manager's roles matrix. We propose the author's scheme for the formation of managerial competencies of a

Table 1. Global trends in the knowledge-intensive product market

No.	Trend	Consequences
1.	Growing importance of high-tech products	Emergence of cross-sectoral technological complexes, the growth of inter-regional and inter-national scientific and innovative cooperation
2.	Shift of attention to the processes of creating systems and the systematic usage of innovations	Adjustment of methods of state regulation of innovative development
3.	Expansion of interaction between science, education, production, and business structures	Growing importance of high-tech complexes, innovative entrepreneurship, and innovative infrastructure in the economy
4.	Innovative development type of the national economy	Efficient usage of resources in priority areas of scientific, technological, and innovative economic development
Source: own compilation.		

head of an organization in the field of high-tech and knowledge-intensive economic sectors and present the model of the leadership institute development.

Theoretical materials and methods

The priorities of social development in the modern knowledge-intensive economy, which is based on knowledge and the carrier of this knowledge – human capital, require a new vision regarding the formation of competencies among leaders who are capable of transformation, setting a change direction, and becoming catalysts and conductors of transformational processes [14–16]. In this regard, it is necessary to note the importance of approaches and methods in the development of human capital:

– systematic approach: human capital development is associated with its improvement in the professional sphere, i.e. labor. Any activity (mental or physical) depends on the thought processes that lead a person to certain actions. In the process of thinking, a person relates practical experience to acquired knowledge and competencies he/she owns and develops, which allows deeper penetration into the essence of an activity. This is the meaning of the systematic approach as the highest level of algorithmization activity in the development of understanding the world and incrementing knowledge;

– motivational approach to human capital development allows us revealing the creative potential that can cope with the challenges of the modern world, the value of which is determined by the critical thinking skills, the availability of applied knowledge and competencies that are in demand in a rapidly changing economy. Since the social side dominates in the structure of a personality (worldview, needs, interests, ideals, moral qualities, etc.), the main goal of human capital development is a free development of an individual;

– integrative approach forms a holistic picture in human capital development (the integration core) and contributes to the consideration of the development process;

– synergetic approach is considered in the context of organizational changes to achieve a qualitatively new synergetic model of human capital. In this context, the use of a synergistic approach allows understanding what needs to be changed and how;

– competence approach: the importance of key competencies cannot be disputed, as they are necessary for any professional activity, as they are associated with self-improvement of an individual in a rapidly changing economy. Possession of key competencies allows solving any professional problems;

– information and digital approaches, the essence of which in the field of development of polyvalence of human capital knowledge is determined at the level of an object, functional orientation of its goals, which consist in the multidimensional dynamic development of the spatial educational component of information knowledge.

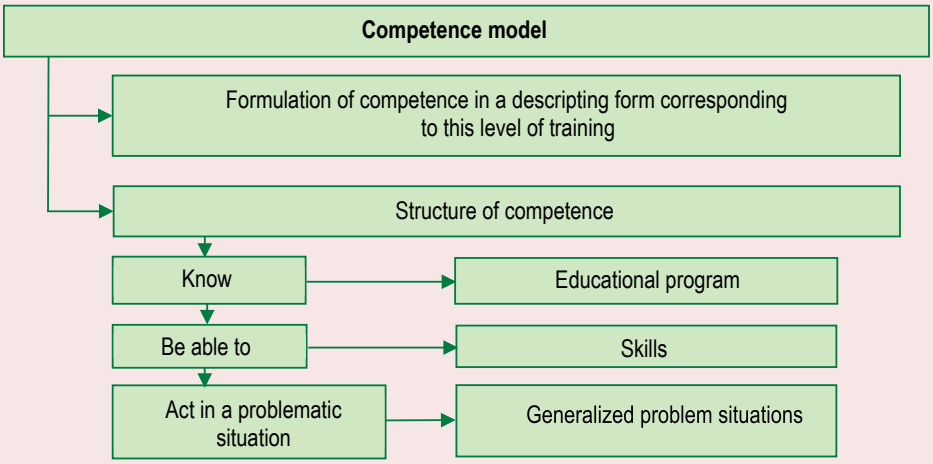
Thus, a successful formation of necessary competencies depends on how their composition, structure, and determination will be defined from the point of view of practical application, functioning, and development [17]. Currently, several principal areas are being considered:

– possible paradigm changes in the application of digital technologies;

– interiorization of skills to improve digital activities;

– analysis of multidimensional processes associated with the acquisition of experience in mass education digitalization.

Figure 1. General structure of the competence model



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Let us review the competence model's general structure *(Fig. 1)*.

A high competence of a leader, which is manifested in his conceptual and positional form of personnel management, is based on optimal ways of organizing joint activities, purposeful usage of various psychological and managerial factors that increase group and individual production efficiency, ability to use a right type of interaction and avoid socio-cognitive personal conflicts. Given this understanding of functions, activities of a leader in high-tech and research-intensive industries within digitization can be reflected in the following qualities from a psychological point of view (*Tab. 2*).

A leader in institutions and industries, related to high-tech and knowledge-intensive economic sectors, is an object of active communication who performs an important communicative function. He/she organizes professional actions through a system of various social connections in the form of direct communication between participants of internal and external social networks through planning, analysis, and reflection of their own actions, actions of partners, their mutual adequacy, and adequacy of possible joint actions for achieving the goal. Thus, links between personal and collective interests are strengthened, and, therefore, we can talk about the synthesis, as well as a possibility of a qualitative transformation of a leadership's desire for self-affirmation, which ultimately should take self-realization form in achieving collective goals and solving group strategic tasks.

Additionally, it is necessary to identify criteria, indicators, and levels of development of a leader's competence.

We believe that top-level leaders should be further evaluated by such criteria as:

– delegation of rights and obligations;
– strategic thinking;
– ability to provide a feedback;
– complexity and responsibility of management tasks performed;
– high level of professional competences;
– striving for the development of an organization's human capital;
– ability to work in accordance with the declared values.

Table 2. Characteristics of a leader's personality traits in high-tech and knowledge-intensive economic sectors

Qualities	Characteristics
Systematic skills: professional and intellectual in the field of process management	Creative use of the program-role concept of a scientific and production team, the use of theoretical educational base, professional intelligence and logical thinking to build a multi-level structure of group processes, the introduction of applied scientific concepts that have an innovative nature and are necessary to achieve high production results, strategic thinking, a high level of professional competencies.
System-forming skills: situational-communicative and organizational	The application of the concept of personality development in socially useful activities in technology-intensive industries, the presence of responsibility and creativity, based on the principle of active mediation in the solution of practical problems, high communicative and personal potential, promotion of high standards of planning and controlling activities of managers and subordinates a sense of responsibility for the expected results, the ability to create internal and external networks of influence
Individual psychological: emotional and volitional	The use of the concept of integral individuality in the determination of personality type in a collective-form industrial and scientific activity, the availability of self-motivation to personal development and establishing high standards for themselves and subordinates, high level of determination and extraordinary will power, informative motivation research-production team to achieve a goal, focus on the formation of intellectual-intensive human capital of an organization, the ability to manage their own emotions, stress and conflict resistance, empathy, resistance
Individual-positional: spiritual and moral	Personal involvement in the scientific or industrial process, high morality from the point of view of the collective and society, active citizenship, formed ethical culture, the presence of moral values
Source: own compilation on the basis of a manager's role matrix (I. Adizes). Available at: https://tavalik.ru/tipologiya-rukovoditelej-po-i-adizesu/	

Based on this list, we can say that a primary criterion for evaluating a leader in high-tech and knowledge-intensive sectors of the economy is the level of manifestation of intellectual potential, managerial competencies, and leadership qualities.

Below, there is a model of the formation and development of a leader's competencies in the course of his/her professional activity. Its development should be carried out in several stages *(Fig. 2)*.

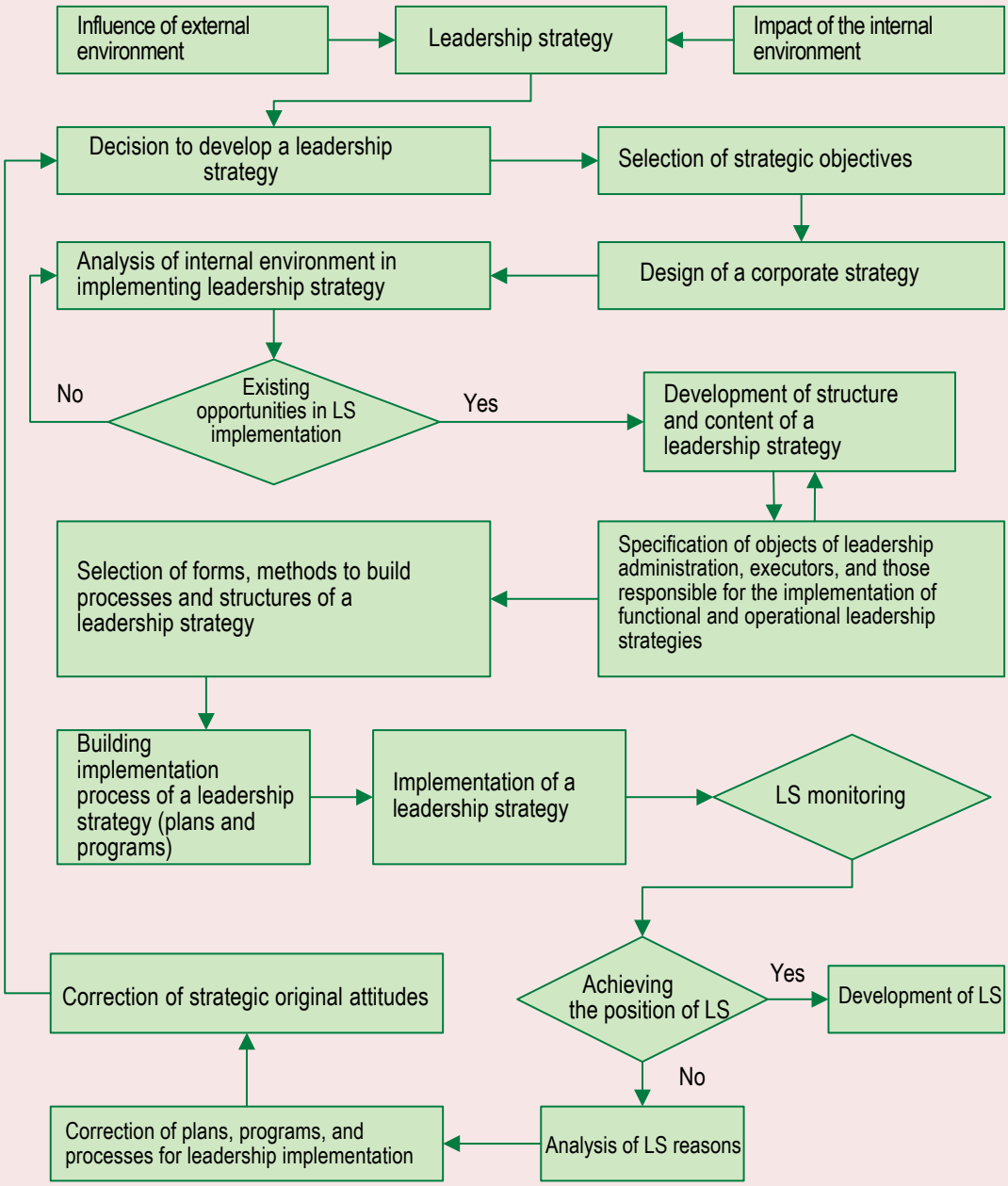
At the first stage, it is necessary to develop a leadership strategy for all levels of an organization's management. It should be selected for one year and then adjusted in accordance with long-term plans and strategic goals of an organization. At the same time, the following recommendations for the implementation of a leadership strategy are proposed *(Tab. 3)*.

At the second stage, the leadership management process should be developed. The organization of effective leadership in high-tech and knowledge-intensive economic sectors requires information management support. First of all, it is necessary to accumulate

Table 3. Measures to implement the leadership strategy

Content of an activity	Products of activity	Expected results
Creation of a system of organizational and managerial leadership	Programs for the effective use of intellectual potential; assessment of the value of intellectual property and goodwill	Development of forms and methods based on the widespread use of IT technologies, development of network virtual structures, technologies; outsourcing of routine operations
Formation of information culture in an organization	Leadership indicator system, modern management business processes based on complex virtualized IT-infrastructures	Formation of work schedules and modes for employees with leadership competencies in high-tech and knowledge-intensive sectors of the economy
Formation of a system of motivation and stimulation of personnel	Structure of competences	Formation of information and intellectual culture for the development of leadership qualities of personnel, etc.
Source: own compilation.		

Figure 2. Model of formation and development of competencies of a human capital leader in professional activity



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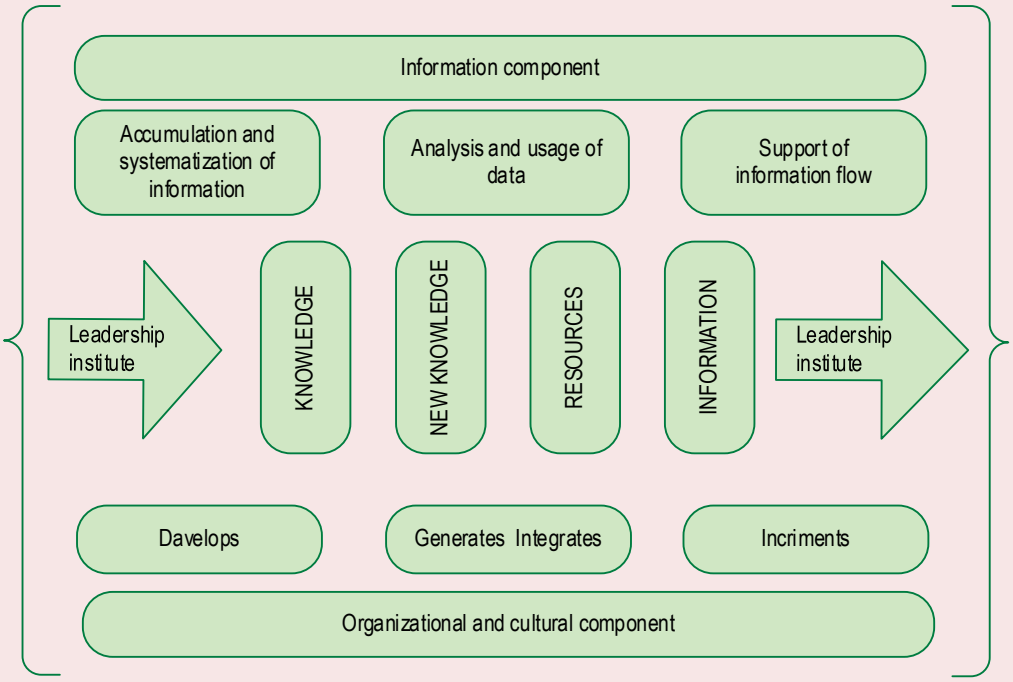
information converted into an information system according to a single template *(Fig. 3)*.

According to the model, a leadership development in an organization, reflected in the results of personnel's incremental competencies, can become the "leadership institute", the intellectual capacity of which is used for developing an organization and gaining leadership positions – on the world stage included. At the third stage, it is necessary to select and develop an effective system for

Figure 3. The process of developing the Institute of leadership in an organization



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evaluating the leadership competencies of employees, which can be implemented by an organization's center for evaluating employees' professional competencies.

The process of implementing leadership positions is based on the interest of external and internal parties, partners, consumers, staff, government, and public structures, but there are also disinterested parties – competitors in most cases. Consider the model of the process of achieving leadership positions (*Fig. 4*).

Let us review an algorithm for evaluating an organization's leadership strategy in high-tech and knowledge-intensive sectors of the economy. To do this, it is necessary to define criteria that will reflect a degree of achievement of the mission and strategic goals set. Criteria and indicators are related, first, to the analysis of dynamics in achieving and maintaining leadership positions in general and in certain areas of an organization's activities; second, to the statics and dynamics in relation to competitors; third, to the achievement of strategic goals and objectives.

Leadership indicators are indicators designed to assess individual aspects of leadership in achieving stated positions [18].

The structure of the leadership assessment methodology is shown in *figure 5*.

As a comparison with the requirements for a leader's competencies in high-tech and knowledge-intensive sectors of the economy, we should consider the number of key competencies of a top manager in a particular industry. These include an ability to work with the goals and values of a company, the ability to effectively communicate externally and internally, an ability to accurately select key employees and use their best strengths in business [19].

Figure 4. Model of the process of achieving leadership positions

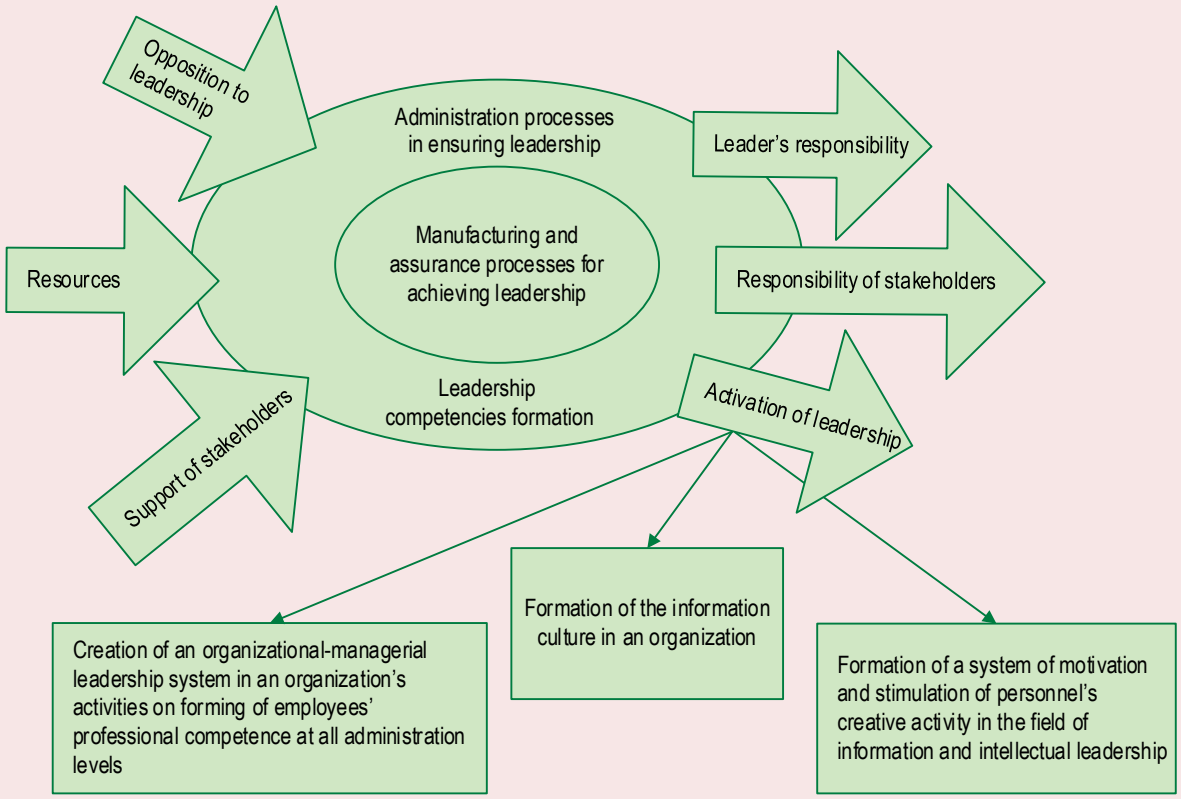

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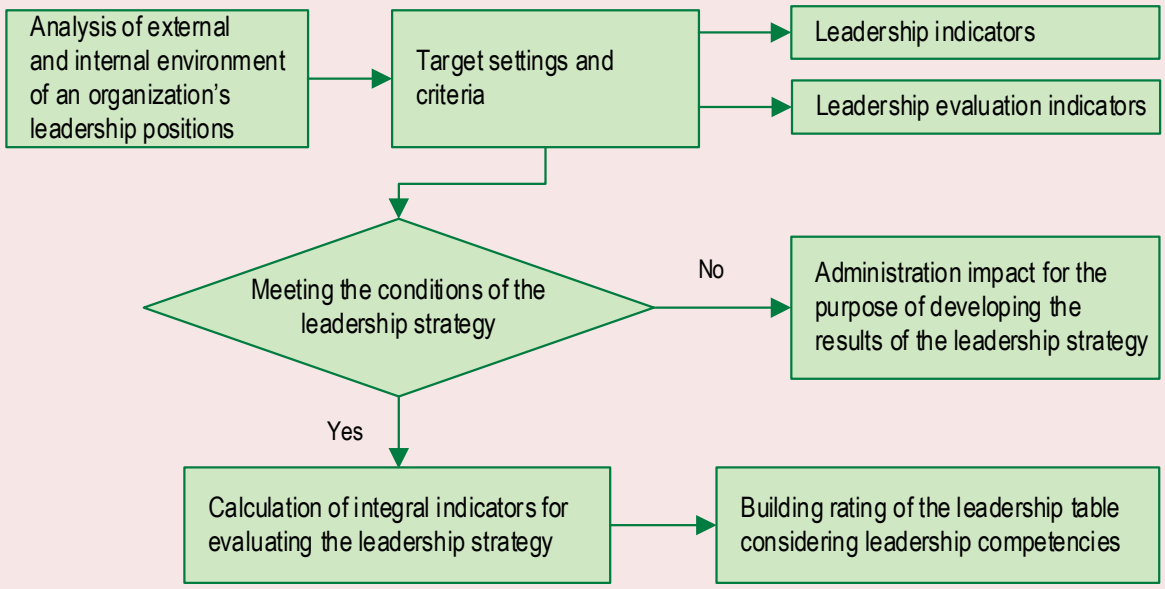
Figure 5. Structure of the leadership assessment methodology



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Implementation of a comprehensive assessment of leaders in high-tech and knowledge-intensive sectors of the economy will solve the following tasks:

– formation of competencies in the field of management, also through training and receiving feedback from experts;

– creation of a communication platform for the exchange of experience between specialists in this field;

– promotion of the further development and dissemination of best management practices.

Assessment of general professional competencies and personal qualities

The modern economy requires higher education to form a new format of human capital, which has an ability and competence, so the structure of human capital activity in modern society, depending on which the education process should be built, changes [20]. It is very important to understand that the formation of leadership competencies in the students' training is a significant stage in the further development of competencies in the professional sphere.

On the basis of statistical data of studies, conducted by the Industrial Development Fund[1], the Agency for Strategic Initiatives[2], a report of "RESMARK" company on conducting the marketing research "Survey of employers of graduates"[3], and other sources[4] [21], in which the purpose was to identify the level of the competence formation in training future leaders in the field of digital leadership in technology-intensive industries making appropriate adjustments in the education process, we analyzed the indicators of the assessment of a graduate's competencies by an employer (*Fig. 6–8)*.

Assessment of general professional competencies and personal qualities (n = 162).

Question wording for a respondent: evaluate the main general professional and personal – important for a specialist – competencies on a five-point scale to understand the extent of these skills among tested graduates. Rate it from 1 to 5 (or 0).

In general, employers' assessment of competencies and personal qualities of graduates was 4.5 points on a five-point scale. The lowest score (3.7) concerns public speaking skills. This indicates that students are not ready or able to fully present their projects, research results, or themselves.

Within the framework of the bachelor's degree in certain areas (management, state and municipal administration (SMA), economics, information technology (IT), business informatics (BI), statistics, applied informatics (AI), mechatronics and robotics (MiR), law), data on the assessment of general professional competencies and personal qualities are presented (see *Fig. 7*).

Certain skills of graduates – creativity (16%), communication (27%), and stress resistance (29%) – are not sufficiently developed. A higher assessment was given to the formation of competencies like an ability to work in a team (36%), initiative (37%), adaptability (38%), and focus on quality (38%). The highest indicator of demand and assessment of professional competencies is in the following areas: working capacity (39%), readiness for development (40%), focus on

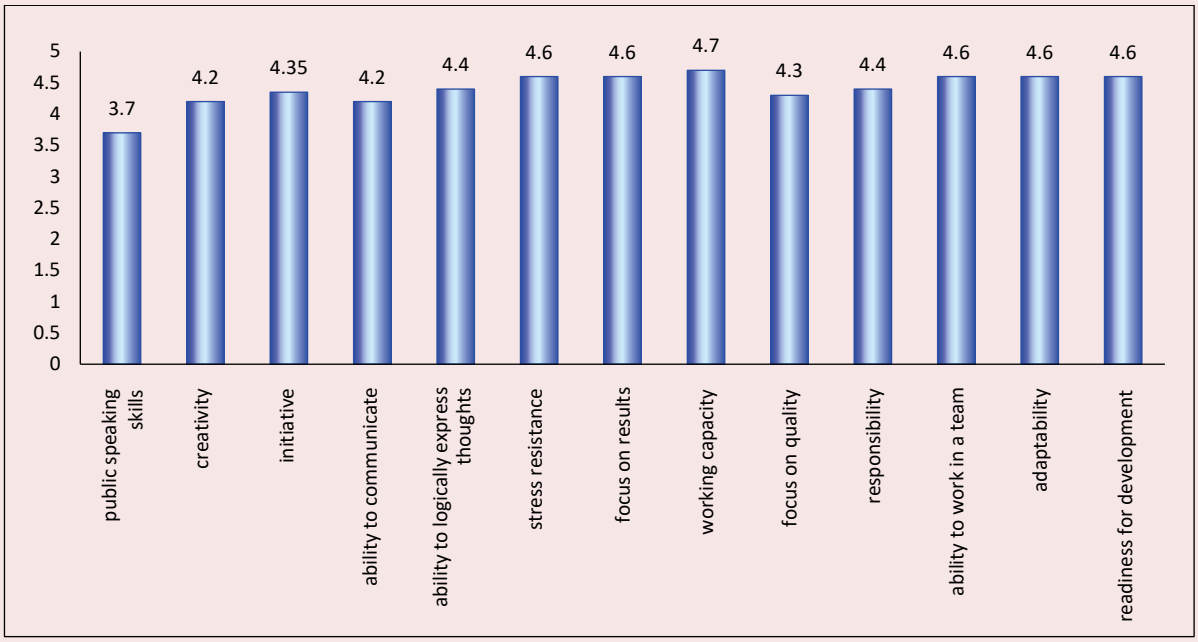
[1] *Official website of the Industrial Development Fund*. Available at: https://frprf.ru/ (accessed: May 1, 2020).

[2] *Official website of the Agency for Strategic Initiatives*. Available at: https://asi.ru/ (accessed: May 1, 2020).

[3] A report of "RESMARK" company on conducting the marketing research "Survey of employers of graduates". Available at: https://www.hse.ru/data/2013/06/27/1285966609/RESMARK_OTCH_%D0%9A%D1%80%D0%B0%D1%82%D0%BA%D0%BE_060413.pdf (accessed: May 1, 2020).

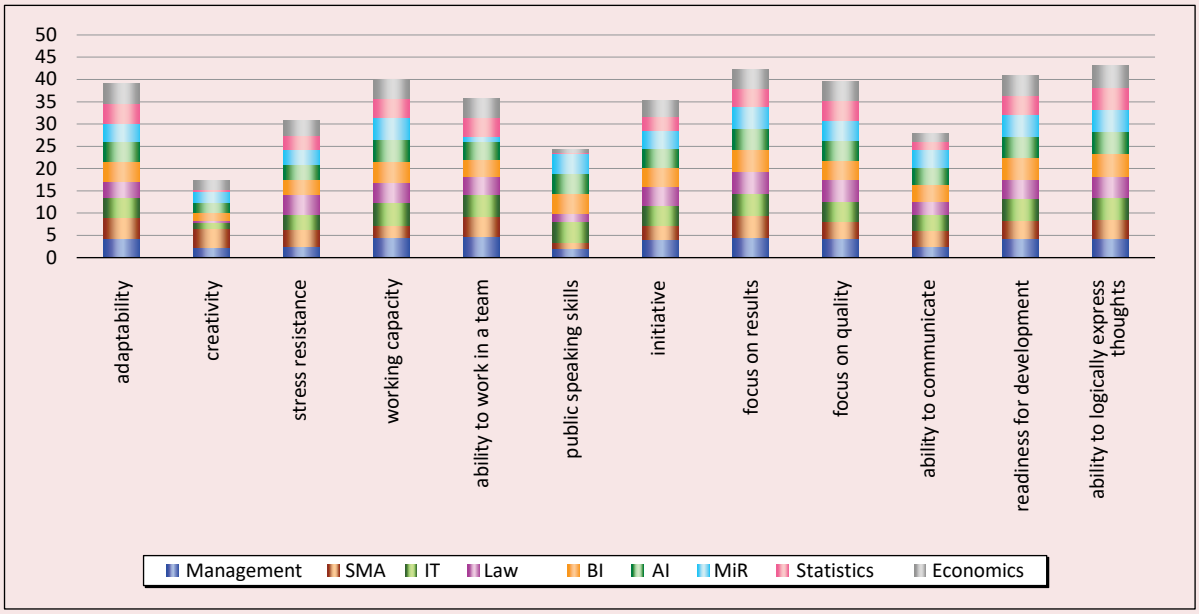
[4] Eskindarov M.A., Belyaeva I.Yu., Danilova O.V., etc. *Corporate Governance in Charts and Tables*. Moscow, 2019.

Figure 6. Assessment of general professional competencies and personal qualities of a graduate by an employer, 2019



Source: a report of "RESMARK" company on conducting the marketing research "Survey of employers of graduates". Available at: https://www.hse.ru/data/2013/06/27/1285966609/ RESMARK_OTCH_%D0%9A%D1%80%D0%B0%D1%82%D0%BA%D0%BE_060413.pdf (accessed: May 1, 2020).

Figure 7. An employer's assessment of general professional competencies and personal qualities of a graduate in areas of bachelor's degree, 2019, %



Source: a report of "RESMARK" company on conducting the marketing research "Survey of employers of graduates". Available at: https://www.hse.ru/data/2013/06/27/1285966609/ RESMARK_OTCH_%D0%9A%D1%80%D0%B0%D1%82%D0%BA%D0%BE_060413.pdf (accessed: May 1, 2020).

results (41%), and ability to clearly express their thoughts (42%). Figure 8 shows the assessment of professional competencies.

Based on data in figures 6–8, it is possible to identify the strengths and weaknesses of graduates based on the results of a survey of employers in each bachelor area. In general, considering common professional competencies (see *Fig. 6*), it is necessary to note an average level from 3.5 to 4 points (the highest score is 5). However, indicators in certain areas revealed problem zones (see *Fig. 7*): rather low indicators of creativity, communication skills, public introduction and presentation of information, stress resistance. The assessment of professional skills is also a reason for reflection. The level of knowledge of information technologies, skills in the structure of cloud technologies and software is insufficient among graduates of non-specialized and profile specialities (see *Fig. 8*).

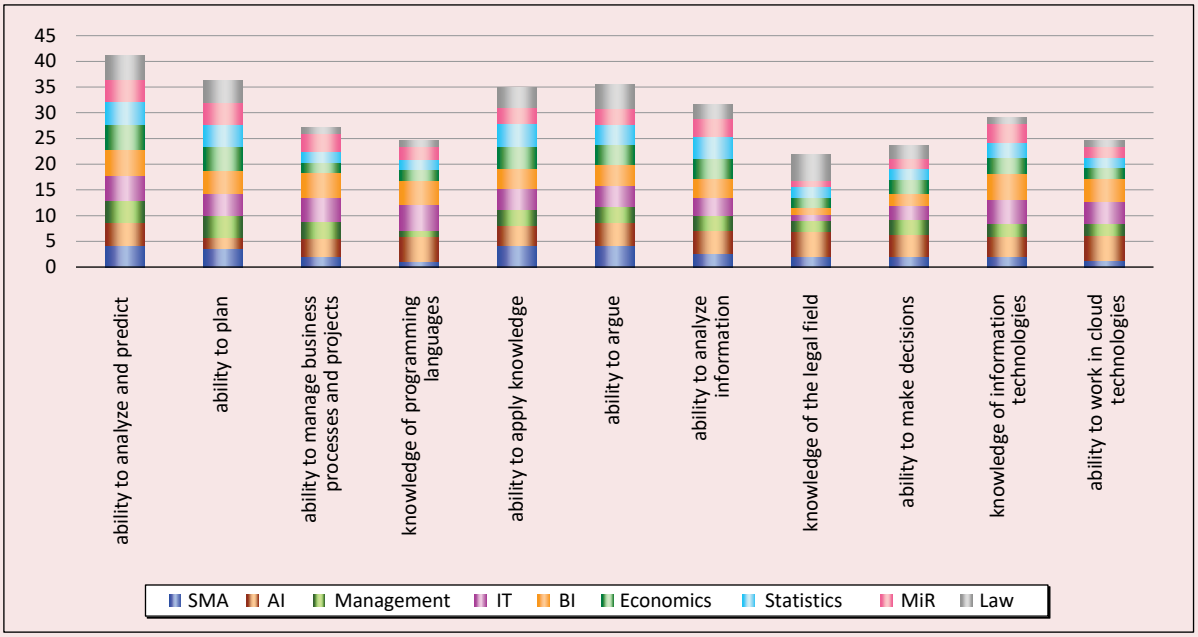
The study showed that, currently, the labor market and the market of educational services weakly interact with each other. Although, there are attempts to build interaction on the basis of cooperation. Employers are interested in high-quality specialists, and they are ready to cooperate on mutually beneficial terms.

Discussion

On the basis of the analysis, we systematize the key competencies for the knowledge-intensive economy. *Figure 9* shows the levels of professional and supra-professional competencies in the context of the development of the fifth and sixth technological modes.

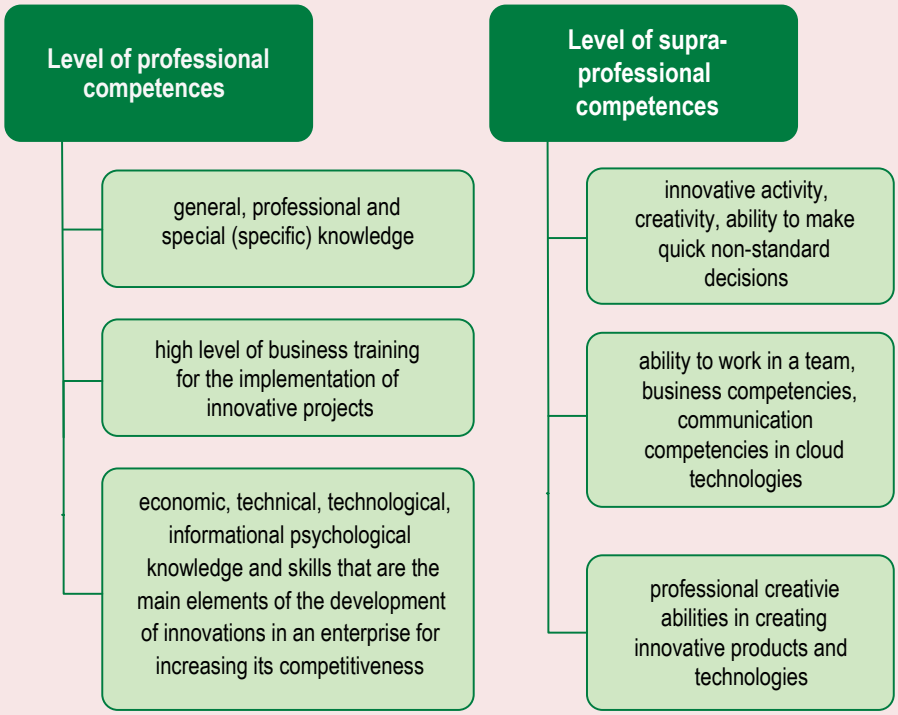
As shown in figure 9, priority is given to the technical direction and breadth of the views. The human capital of an organization, on the one hand, is its resource; on the other hand – its human wealth.

Figure 8. An employer's assessment of graduates' professional qualities in bachelor areas, 2019, %



Source: a report of "RESMARK" company on conducting the marketing research "Survey of employers of graduates". Available at: https://www.hse.ru/data/2013/06/27/1285966609/ RESMARK_OTCH_%D0%9A%D1%80%D0%B0%D1%82%D0%BA%D0%BE_060413.pdf (accessed: May 1, 2020).

Figure 9. Structure of the main professional and supra-professional competencies within the fifth and sixth technological structures



Source: own compilation.

Based on the analysis of competencies, required in the modern economy, five main types of competencies that are in demand in human capital development were identified: basic, information, digital, entrepreneurial, and personal.

Leadership is won in any type of activity and in all processes: production, management, provisionary, marketing, etc.; therefore, to assess the leadership of an organization, indicators and parameters are necessary to justify the process of achieving leadership and further manage it. As part of the discussion, it is necessary to consider such concepts as sustainability and flexibility of developing competencies. Flexibility will be a key property that should be achieved in the formation of the competence model. The following activities should be promising directions for further activities in this area: assessment of Russian organizations in high-tech and knowledge-intensive sectors of the economy, their ranking, and development of support measures. As a result, you need to create assessment centers of competencies in technology-intensive industries on the basis of universities in each region and develop a strategy for the implementation of innovative technologies in organizations. This clearly emphasizes a high coefficient of commercial potential of the conducted research.

Conclusion

The concept of creating high-tech industries forms the competitiveness and growth prospects of national economies, which are based on modern high-tech technologies and products with high costs of intellectual labor for their production. The demand in the modern

market of high-tech and knowledge-intensive technologies is focused on highly qualified specialists who are able to independently make effective management decisions and have a set of certain knowledge and competencies that contribute to the development of the company's activities [22; 23]. It is a trained human capital, which owns modern training technologies and can quickly solve tasks, may develop breakthrough technologies.

We obtained the following results:

1. We defined systematic, strategic, communicative, organizational, psychological, and individual-positional qualities of a leader in high-tech and knowledge-intensive industries and characterized them using the matrix of a manager's roles. We highlighted criteria and levels of development of a leader's competence.

2. We presented the model of the formation and development of competencies of a leader in the field of human capital management in the course of his/her professional activity, which allows an organization to develop options for a leadership strategy, and proposed measures for their implementation. The author's vision, regarding the development of the leadership institute in an organization and, as a result, the model of achieving leadership positions, is given.

3. Based on data of statistical studies, the authors analyzed the indicators of employers' assessment of the competencies of bachelor graduates of modern universities and identified "painful" points of the formation of professional and personal qualities of future specialists in high-tech and knowledge-intensive economic sectors. It is concluded that there is a need for closer interaction between the labor market and the market of educational services.

Research shows that acquisition of knowledge and skills through the education system will help people improve their cognitive abilities and become more productive. People with more intellectual capital will be able to use their potential more effectively, and they will be more productive at work. There is a need for a breakthrough approach and a change in the structure of interaction between educational organizations and professional communities, a more flexible response of all departments when agreeing on necessary documents for the implementation of educational processes.

Many economists confirm the fact that investments in the development of human capital can affect the future real income of the state due to the formation of necessary knowledge and skills of society's individual members. Research shows that, like financial capital, human capital is an intellectual national resource, and it creates a cumulative effect that will be producing a positive result over a long period of time.

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Received October 23, 2020.

DOI: 10.15838/esc.2020.6.72.13
UDC 316.7, LBC 60.54

Youth's Activity in Changing Reality: Self-Regulation Contradictions*

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Abstract. The article substantiates the socio-cultural approach to the study of self-regulation contradictions of youth's activity. The developed approach considers the process of forming the meanings that determine the content orientation of self-regulation contradictions in changing reality. As a source for youth's development, the authors analyze contradictions between cultural and social, unconscious and conscious, traditional and modern, objective and subjective. The researchers carry out the empirical testing of the developed concept on the basis of the study results in relation to education, labor and family. Both conservative and constructive components become evident in the clash of culture and the social. The conservative component is associated with situations of various forms of economic restrictions, while the constructive one is related to rationalizing youth's attitude to education, labor and family, and searching for alternative ways to resolve contradictions. The contradiction between the unconscious and the conscious manifests itself as a conflict of essences – terminal, self-valuable, instrumental and rational

* The article is prepared within the framework of RFBR grant no. 20-011-00585 "Youth's activity self-regulation in changing social reality".

For citation: Zubok Yu.A., Chuprov V.I. Youth's activity in changing reality: self-regulation contradictions. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 215–231. DOI: 10.15838/esc.2020.6.72.13

attitude to the objects of reality. The contradiction between the traditional and the modern appears in different ways in education, labor, and family. In education, traditional educational values are devalued; there are no conditions for strengthening the modern ones. In labor, the historically formed contradiction of its instrumental and terminal essence persists. In family relations, there is a sharp discrepancy between the youth's desire for modern forms of family creation and the traditional forms that dominate in the society. The contradiction between the objective and the subjective in various spheres reflects the existing problems of objective reality and the subjective youth's attitude toward them. Empirically, the authors analyze the contradictions based on the results of comparative sociological studies conducted in 2014 and 2017.

Key words: youth, activity, self-regulation, changing reality, cultural and social, unconscious and conscious, traditional and modern, objective and subjective.

Introduction

Any social group's activity including youth is largely a self-regulating process. Self-regulation is shown in the ability of different youth groups to influence the conditions of their life by adapting social reality to their needs. Self-regulation is based on the images of reality constructed by young people, i.e. the essences and the meanings that they give to objects of reality that are formed in the socialization process. Formation of meanings occurs in the cultural space through the implementation of social culture functions, the most important of which is regulatory, aimed at adjusting social interactions.

Formation of meanings is accompanied by contradictions that represent "a certain type of interaction of different and opposite sides and properties, as a part of a particular system or between systems, the collision process of opposite aspirations and forces" [1, pp. 241–242]. Contradictions in the youth's life arise in the interaction of opposite sides of the mechanism elements of its self-regulation: the cultural and the social, the conscious and the unconscious, the traditional and the modern, the objective and the subjective [2, pp. 114–123]. In this regard, to study the youth's activity and the contradictions that arise in their self-regulation process in a changing social reality, it is necessary to solve the following tasks.

First, the *correlation between the cultural and the social* needs theoretical justification in the organization of the youth's social life. Second, it is necessary to substantiate the connection of the *archetypal and mental structures of the collective unconscious with the rational foundations of self-regulation* of social interactions. Third, it is essential to identify stable types of social *connections between the traditional and the modern* in the organization of young people's social life. Fourth, it is important to have an idea of the correlation between *the objective and the subjective* in the social reality construction by youth. The solution of these tasks is aimed at substantiating a holistic approach to the socio-cultural self-regulation of youth's activity. It is provided by the general methodological orientation of the theoretical development of contradictions as a source of development in various spheres of youth life: education, work, and family relations.

Research methodology

In modern society, the forming-up process of the youth's activity is constantly changing. Increasing uncertainty, prolonged adulthood,

prolongations of the marginal state and, as a result, the growth of social contradictions within different youth's groups cause the basic differences that characterize the conditions of life and the ways of its regulation. In a relatively stable society, individual, local groups of young people with a deliberately low social status and limited resources for self-development are the most vulnerable to social problems. However, in the context of global transformations, the social base of contradictions is expanding. Escalation of the contradictions is characteristic for all types of societies which are reflected in the features of youth's activity and their self-regulation mechanisms [3–8]. The prospects for their resolution are related to forming-up individual and group social and cultural strategies of the transition, overcoming the new types of inequality that have emerged due to the changes in labor, education, and digital reality [9–13].

Global socio-economic and socio-cultural transformations are fixed in the "social generation" [14], in the images of reality and ways of activity. These include the gradual consolidation of unreliable work, combination of work and study for a long time, adoption of flexibility and mobility strategy, unpredictability and risk as immanent components of activity. These conditions and the corresponding attitudes form the basis of the *"new adulthood"* phenomenon [4, p. 20; 15; 16]. They speak about the growth of various contradiction types in the youth's activity, based on a wide context of social and cultural changes in the activity conditions, objective conditions of reality and their subjective perception, the youth's expectations, their intentional aspirations and experiences, ways of life activity organizing.

When substantiating contradictions, we rely on the theoretical approaches contained in the works of M. Weber, C. Jung, A.S. Akhiezer, N.I. Lapin, and A.B. Hoffmann.

A.S. Akhiezer's socio-cultural theory contains the theoretical justification of the *contradiction between the cultural and the social* in life activity. The author proves the existence of an "eternal split" between social relations and culture. He considers the inconsistency as a fundamental attribute characteristic, and sees more of an innovative essence in culture than in social relations. The researcher defines culture as "a sphere of creativity and fantasy, and social relations should always remain functional by virtue of their very embodiment in the mass reproduction process" [17; 3, pp. 22–23]. The new socio-cultural reality which has been forming since the end of the 20th century contributes to the tradition of transforming rather than conservative functions to human culture. There is a reorientation of the socio-cultural history. The realization of the problem of individuals' subjective ideas, thoughts, abilities, and intentions in the space of possibilities limited by objective conditions comes to the forefront of researchers' interests. The authors believe that it is in this formulation that the socio-cultural approach is most clearly expressed: culture is a way of implementing subjective ideas, thoughts, abilities, intentions of individuals, and the social reflects objective conditions, frames, boundaries, and structure as a whole [18, p. 130]. This implies a contradiction between culture as a way and the social as the youth's life activity conditions.

The basis of N.I. Lapin's socio-cultural approach is not a dual opposition of the social and the cultural, but a triple one. The author introduces the actor as a carrier of cultural and social relations. Its subjective role is manifested in the tradition and innovation. These three main components of society are equal in relation to each other, but they interpenetrate each other, and are therefore inseparable. There is no sociality outside of culture and individuals,

there is no culture outside of sociality and individuals, and there are no individuals outside of sociality and culture.

The *contradiction between the unconscious and the conscious* arises between the ideas, views, and images that persist in the collective unconscious and are reproduced by young people, on the one hand, and rationally meaningful orientations to achieve specific goals, on the other.

The basic elements of reality images are formed historically in the self-regulation mechanism in the form of archetypes of the collective unconscious and mentality, being fixed in the group and individual consciousness of young people. Reflecting the previous generations' experience, *archetypes*, as cultural prototypes[1], provide the formation and inheritance of semantic bases of attitudes to the objects of social reality. *In mental structures*, the attitude to the objects of social reality is fixed in the unconscious and unreflexed forms, as a property of the individual, group, society, and nation, manifested in the national character features. In the interaction of both forms (the unconscious and the conscious), their unity is ensured in the self-regulation process.

The *contradiction between the traditional and the modern* in the ways of organizing the youth's social life is revealed basing on the understanding of these phenomena essence.

In its most general form, sociology understands tradition as "a social and cultural heritage passed down from generation to generation and reproduced in certain societies and social groups over a long period of time"[2]. Summarizing the existing approaches to the problem of the correlation of traditions and innovations and comprehending in this way the Yu.A. Levada's legacy, V.V. Kolbanovskii defines it as follows: "*tradition* is a mechanism for the reproduction of social institutions and norms in which the maintenance of the latter is justified, legitimized by the very fact of their "existence in the past" [19, p. 11]. Traditions are preserved in people's historical memory in the form of cultural samples. A.B. Hoffman writes, "Each generation does not just assimilate them in an unchanged and ready-made form. It inevitably, one way or another, makes a selection among them, interprets them in its own way, ascribes new essence and meanings to them that did not exist before it" [20, p. 19]. New meanings and innovations arising on the basis of traditions are transformed into new cultural patterns (traditionalized) becoming an integral part of the cultural heritage.

Tradition can serve as a universal form of maintaining social organization mainly in relatively simple and stable social structures. In more developed societies, it only *complements* the system of ideological and other institutions. However, along with tradition, and often *within* it, there is an *innovation* associated with a modern change in social relations and institutions, so a certain reproduction degree of traditions does not mean immutability, but implies their renewal (innovation) by giving new meanings or transforming them into new forms ("traditionalism modernization", as A. Hoffmann defines). Moreover, "today, more than ever, traditions are the object of choice, interpretation and actualization; individuals and social actors choose not only their present and future but also the past. Traditional cultural patterns are often contained inside the variety of innovations" [19, p. 27].

[1] Jung C.G. *Archetypes and the Collective Unconscious.* Moscow: Direct-Media, 2007. P. 77. Available at: http://biblioclub.ru/index.php?Page=book&id=36246 (accessed: September 30, 2020).

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Unlike the traditional one, the modern type of social life organization is based on the purposeful motivation of social actions. "An individual whose behavior is focused on the goal, means and side effects of his/her action acts purposefully...i.e., he or she acts, in any case, not affectively (primarily not emotionally) and not traditionally" [21, p. 629]. In other words, modern organization of social life is based both on tradition and on rationality principle assuming that the actors achieve their goal, correlated with rationally sensible means.

N.I. Lapin introduced the concept of "incomplete (relative) responsiveness (correspondence)" between these components. Responsiveness is developed as a natural-historical process of social reproduction [19; 22, p. 143; 23].

Traditional culture reproduction occurs in the process of generation change. Each new generation finds the culture created by the previous generations, changes it through its own activities, and transmits it in a modified form to the subsequent generations. In the process, the young generation obtains its own quality as a social group. Its main functions are reproductive, aimed at inheriting cultural samples; innovative involving their renewal, and translational ensuring the transfer of updated samples to future generations. In this regard, the contradictions in self-regulation mechanism of the young people's activity *arise between the tradition and the innovation in the process of its subjectivity formation*.

The *contradiction between the objective and the subjective* is substantiated in the paradigm of the phenomenological sociology of knowledge on the basis of which the entire social reality is considered. As the knowledge complex about the essence and characteristics of the manifestations of everything that a young person encounters in the course of social interactions is mastered, the objective aspect of social reality, social currency is revealed. Cognizing objective reality, a young person directly perceives its part about which he or she has own knowledge. It means that subjectively reality manifests itself in a person's confidence in the reliability of their own knowledge about the observed objects. And the essence of social reality is rooted in the *relationship between the objective and the subjective* in social reality.

Knowledge is distributed in society; young people construct the objects of reality in their minds in accordance with the knowledge availability depending on their own social status when young people realize themselves as members of a certain social group, the owners of a certain social status. The construction of one's own life also depends on the quality of the acquired knowledge, as far as it corresponds to the expectations associated with the performance of specific social roles. On the one hand, the result of awareness of one's social position is expectations from reality, and on the other – social meanings that fill the constructed reality, so there is a contradiction between the objective and subjective sides of social reality in the life activity self-regulation process.

To analyze the contradictions, the article uses the results of two studies of the Center for Youth Sociology of the Institute of Socio-Political Research of the Russian Academy of Sciences (ISPR RAS) guided by the authors: 1) in 2014, among the population aged over 15 years old in 13 entities of the Russian Federation, in 65 localities; 1459 persons were interviewed, the sample of youth aged 15–29 was 401 people; 2) in 2017, in 7 entities of the Russian Federation, in 28 localities; the sample of young people aged 15–29 was 803 people.

Contradiction of the cultural and the social in the organization of youth's social life

In the contradictions between culture and social relations, actor's position plays an important role in the self-regulation mechanism of young people's activity. It reflects not only conflicts, but, at the same time, subjective possibilities to overcome the discrepancy between the cultural and social grounds in implementation of youth's expectations. It is reflected in various spheres of activity.

In education, this is the contradiction between the knowledge value and the availability of fee-based education. At the empirical level, the knowledge value is contained in the answers to the question about the young people's attitude to knowledge: as the main asset of a person or something optional which is easily compensated by money (*Tab. 1*).

As table 1 shows, fully fee-based education is available only to a small part of young people (8.6%), and for every second (47.2%) it is practically not available. However, among the respondents who regard knowledge as the main asset, the share of those who assess the availability of fee-based education is higher and who admit that they will have to cut down the expenses (46.1%). The share of those who assess its inaccessibility is lower (44.9%) compared to those who believe that money is more important than knowledge (41.6 and 50.4%, respectively). So, there is a contradiction between the knowledge value and availability of fee-based education which is manifested in the discrepancy between social conditions in education and the youth's cognitive values.

In *labor*, this is the contradiction between the labor value and self-realization possibilities (*Tab. 2*).

The terminal labor value was determined by a set of the following semantic meanings: utility sense, internal need, and creativity. Instrumental one is the opportunity to earn, forced necessity, communication. Table 2 shows that the relationship of the terminal and instrumental labor value with the respondents' self-assessment of self-realization possibility in this area in most directions of self-realization does not exceed five points on a seven-point rating scale. At the same time, respondents, who highlight the terminal labor value, evaluate their capabilities in all directions of self-

Table 1. Relation of attitudes to knowledge with availability of fee-based education

Attitude to knowledge	Availability of fee-based education, % of the respondents' number		
	Fully available	Available, but it is necessary to cut down expenses	Practically not available
Knowledge is the main person's asset	9.0	46.1	44.9
Today, money is more important than knowledge	8.0	41.6	50.4
In general, among young people	**8.6**	**44.2**	**47.2**
Source: own calculations.			

Table 2. Relation of labor value to self-realization possibilities in labor

Labor value	Self-assessment of self-realization opportunities, C*					
	Find a job	Improve professional skills	Raise salary	Make a career	Defend own rights	Make own business
Terminal	4.93	5.38	4.66	4.59	5.24	3.33
Instrumental	4.65	4.84	4.07	3.94	4.82	4.89
*C – average weighted coefficient on a seven-point rating scale. Source: own calculations.						

realization, except for business, significantly higher than those who support the instrumental value. Consequently, a contradiction arises between the labor values which largely reflect young people's attitude to the economic policy, pursued in the country, and expectations from labor. However, unrealized expectations lead to protest moods. As we can see, the terminal attitude to labor on the part of its actors contributes to overcoming this contradiction with great success, while the instrumental one contributes with less success.

In *family*, this is the contradiction between the family value and the dissatisfaction with the financial situation (*Tab. 3*).

The terminal family value was determined by a set of the following semantic meanings: need (there is no life without a family); goal (i.e., it just has to be); and love. The instrumental value is a necessity (a sense of duty or a sense of unease without a family); means (for a career, comfort); and burden. The majority of the respondents in both groups are unsatisfied with their financial situation. Among those who share the opinion about the terminal family value, the share of dissatisfied people is significantly lower than among those who support the instrumental value (62.7% vs. 80.2). Therefore, dissatisfaction with their financial situation is a significant basis for the analyzed contradiction in the sphere of family relations of young people. Again, the potential for overcoming it is more a terminal attitude to the family, and less an instrumental one.

Thus, in the self-regulation process of youth's activity, contradictions of culture with social conditions contribute to the *satisfactory match* between the socio-cultural ways of realization of the young people's subjective expectations in various activity spheres and the objective conditions of their implementation. In contradiction with social conditions, values perform both conservative and constructive function in self-regulation as fundamental culture elements. Young people, i.e. actors of contradictions, realize these contradictions. The *conservative function* has appeared in all the analyzed activity spheres in the formation of the semantic self-regulation orientation to ensure sustainability, activity stability. This function was realized in more effective overcoming by supporters of terminal values of a number of obstacles arising in connection with the unavailability of fee-based education, limited self-realization opportunities in labor, dissatisfaction with the financial situation in family relations. The *constructive function* is realized as a result of the instrumentalization of the young people's attitude to education, labor, and family, contributing to the search for alternative ways to overcome emerging obstacles including workarounds.

Contradiction between the unconscious and the conscious in youth's life activity self-regulation

The interaction process between the unconscious and the conscious forms is essentially a transition of the unconscious forms into the conscious ones. In this regard, the contradiction between the unconscious and the conscious is mediated, as it reflects the opposites not in the unconscious, but in those

Table 3. Relation of family value to financial satisfaction

Family value	Self-assessment of satisfaction for financial satisfaction, % of the respondents' number	
	Unsatisfied	Satisfied
Terminal	62.7	37.3
Instrumental	80.2	19.8
Source: own calculation.		

systems that are manifested in the group and individual consciousness. In *education* such systems are the values of knowledge and education, the opposite sides of which are the basis of contradictions with archetypes and mentality.

On the basis of the previously developed structure of archetypes [10, pp. 194–196], we will analyze the connection of the archetypes of fate, kindness, conscience, savior, past idealization, shared by young people, with the opposite positions in their attitude to knowledge: "Knowledge is the main person's asset" or "Today, money is more important than knowledge", as well as the terminal and instrumental education values. A set of semantic values determined the meaning of education as a terminal value, such as: developing abilities, need for knowledge, general culture. The instrumental values are diploma, prestige, and career (*Tab. 4*).

The data in table 4 indicate that there is a connection between the archetypes of the collective unconscious and youth's attitude to knowledge and education. Among the respondents who fully agree with the proverbs that reflect the listed archetypes, there are supporters of terminal and instrumental values, and the meanings of the terminal values are noticeably higher than the instrumental values. There is the highest connection meaning with the terminal knowledge and education values with the archetype of kindness (51.3 and 73%, respectively). Agreeing with the meaning of the proverb "Kind hearts are more than coronets", young people expressed optimism that persists in the collective unconscious of Russians which influenced their attitude to knowledge and education mainly as a terminal value. Apparently, the belief in good and self-worth attitude to education occupy a common position in the collective unconscious of the majority of young people. This is confirmed by the answers to the question "Do you believe that kindness will always be rewarded?" Among the respondents who answered positively to it, 56.7% of knowledge is a terminal value, and 43.3% is an instrumental value. However, under the influence of life situations, the picture is changing. The answers to the question "Do you believe that unkind people live better than kind ones?" showed that among those who believe, 47.1% of respondents have already considered knowledge to be the main person's asset. 52.9% are of the opinion that in our time, money is more important than knowledge. So, today, the connection of the kindness archetype with the attitude to education is filled with new meanings.

We note the least significant connection with the terminal knowledge value in the fate archetype (52.7%) which is expressed in agreement with the proverb "What is to be, will be". In various life situations, young people

Table 4. Relation of collective unconscious archetypes to knowledge and education values

Archetype	Knowledge values, % of the respondents' number		Education values, % of the respondents' number	
	Terminal	Instrumental	Terminal	Instrumental
Fate	52.7	47.3	64.3	35.7
Kindness	61.3	38.7	73.0	27.0
Conscience	59.4	40.6	65.1	34.9
Savior	58.3	41.7	47.6	52.4
Past idealization	57.0	43.0	77.0	23.0
Average meanings	**57.7**	**42.3**	**65.4**	**34.6**

Source: own calculation.

differently interpret the meanings, inherent in this archetype, reflecting the dependence on the confluence of circumstances and suggesting the possibility of withdrawing from responsibility for failures in life including in school. To confirm this conclusion, we asked the respondent to determine his life position by choosing one of two alternative proverbs: "Every bullet has its billet" and "God helps those, who help themselves". 58.2% of respondents who share the terminal knowledge value and 41.8% – the instrumental value agreed with the second proverb which reflects the importance of their own position.

Similarly, there are contradictions between the other archetypes of the collective unconscious and youth's attitude to knowledge and education that we identified and described earlier, [10, pp. 291–295]. The average total meanings of the archetypes' association with terminal and instrumental knowledge values are 57.7 and 42.3%, respectively, and 65.4 and 34.6% with educational values. These contradictions reflect the confrontation of the education and knowledge essence that arises in the process of their rationalization during the transition from the unconscious to group and individual consciousness.

We can also trace this trend in the contradiction between mentality and young people's attitude to knowledge and education. The total weighted average coefficients of the relation of mental traits of national character (love of the country, mercy, honor, dignity, love of one's neighbor, suspicion of foreigners), evaluated on a seven-point scale, with terminal and instrumental values of knowledge were 4.99 and 4.93, respectively, with the education values – 5.02 and 4.88. Consequently, the contradiction between the mentality that goes back to the unconscious layer of spiritual life and the value structures in education also reflects the opposites of the rational youth's attitude to knowledge and education.

In *labor,* on the one hand, the contradiction basis between the unconscious and rational is the labor archetype (the question "Which of these proverbs is more suitable to your life position?"), on the other hand, the terminal and instrumental labor values discussed above. We analyzed the following proverbs containing alternative ideas about the attitude to labor "No pain, no gain", "Only fools and horses work", "Idleness rusts the mind", "Eat – sweat, work – chill".

Let us analyze the relation of positively and negatively directed archetypes (the average relation meaning for each proverb) with the labor value (*Tab. 5*).

First, table 5 shows that the meaning of the terminal labor value in groups with a positive orientation of the archetypes (26%) is more than twice as high as its meaning in groups with negative orientation (11.2%). Secondly, at present, there is a clear trend of labor instrumentalization which reflects the influence of increasing dynamism, variability, and uncertainty in this area. Under these conditions, the contradiction of the historically formed ambivalent attitude to labor is intensified. On the one hand, the supporters' share of the terminal labor value increases among holding

Table 5. Relation of archetypes to the labor value

Archetype	Relation to labor value, % of the respondents' number	
	Terminal labor value	Instrumental labor value
Positive orientation	26.0	74.0
Negative orientation	11.2	88.8
Source: own calculation.		

the positive orientation of the archetype. On the other hand, the supporters' share of the instrumental labor attitude increases among adherents of the negative archetype orientation.

The analysis of mental traits relation of national character with the attitude to labor confirms the conclusion about the contradiction between the unconscious and the rational in this area. The total weighted average coefficients of the relation of mental traits with the terminal and instrumental labor values are 4.96 and 4.83, respectively. This indicates a fairly high level of relation (above the average, equal to four points) of the mental traits inherent in young people, both with the terminal and instrumental labor values. Consequently, the contradiction between the mentality and labor values is an interaction of opposites of the terminal and the instrumental young people's attitude to labor.

In *family*, the contradiction between the unconscious and the rational also reflects the splitting process of the family values into the terminal and instrumental ones. At the same time, all analyzed archetypes are more closely related to the terminal values (the average value of the relation is 88.9%) compared to the instrumental values (10.9%). Firstly, this indicates about the dominant role of archetypes in the reproduction of traditional terminal family values by young people, and secondly, the influence of modern instrumental family values as a dialectical opposite in contradiction with the unconscious on the development forms of family relations in changing reality.

The stability of these processes can be judged by analyzing the relationship of mental traits of national character that youth evaluate on the basis of a seven-point scale, with the attitude to the family. The total weighted average coefficients of association of mental traits with the terminal and instrumental family values are 5.05 and 4.51, respectively. It means that the contradiction formed in the archetypal structures of the collective unconscious is fixed in the mental features, defining the specifics of the terminal and instrumental in the family relations of the current generation.

Thus, the analysis confirms the connection of the archetypal and mental structures of the collective unconscious with the rational foundations of self-regulation in various spheres of youth's activity. As a significant basis for self-regulation, there is a split of the values of education, labor, and family into the terminal and instrumental ones which form dialectical opposites of self-regulation contradictions. As the analysis showed, although to varying degrees, these opposites determine the content of the terminal and instrumental young people's attitude to education, labor, and family. If in education and, especially, in family, terminal meanings dominate, and then terminal and instrumental meanings are combined in labor. So, the contradiction between the unconscious and the rational manifests itself as a confrontation of essences, terminal, self-valuable and instrumental, rational attitude to the objects of social reality.

Contradiction between the traditional and the modern in the organization of youth's social life

In *education* self-regulation, the contradiction between the traditional and the modern is traced in the collision of the terminal (traditional) and instrumental (modern) education values. As we have already noted, the education meaning as a terminal value was determined by a set of semantic values – developing abilities (21.4%), the need for knowledge (12.7%), general culture (5%), and instrumental – diploma (17.3%), prestige (5.9%), and career (37.8%).

In general, 31.9% of respondents perceive education as a terminal value, and 60.9% perceive it as an instrumental value. The

instrumentalization trend of youth's attitude to education is characteristic of the entire post-Soviet period, primarily due to the reforms implemented in the country in this area. This trend was confirmed by the results of the previous studies [24, pp. 129–132]. As a result of the education system reform in the young people's minds, historically formed semantic foundations are deformed which traditionally determine the intrinsic value of the cognition process. They are replaced by rational meanings in which education is considered a meaning to achieve other goals that are not related to knowledge. In this regard, the contradiction between the terminal (traditional) and instrumental (modern) education values is manifested as a mutual denial of meanings that reflect, on the one hand, the desire for knowledge, and, on the other – to obtain status.

The analysis of the knowledge value confirms this. The terminal knowledge essence contained in the judgment "Knowledge should always be sought for general development, even if it is not in demand in practical life" is close to 54.5% of respondents. The instrumental essence contained in the judgment "Knowledge is not an end in itself, but a means of solving issues" – 45.5%. Consequently, knowledge remains the dominant youth's value which comes into conflict with the desire for status, giving it its place, under the influence of the instrumentalization of the attitude to education, as a result of its reform.

In *labor* self-regulation, the analyzed process manifests itself in the contradiction between the terminal and instrumental youth's attitude to labor. Labor as a terminal value was determined by a set of the following semantic meanings: utility sense (13.3%), internal need (6.2%), and creativity (4.6%), in total – 24.1%. Instrumental – earnings (61.9%), forced necessity (12.4%), communication (1.5%), in total, it is 75.9%. Consequently, the contradiction is expressed in the dominance of the instrumental labor value.

Numerous studies suggest that this contradiction is rooted in culture which is associated not only with the actual confrontation between traditions and modernity, but also with the peculiarities of historically formed labor relations that were reproduced in Russian society in historical retrospect [24, pp. 261–269; 25]. On the one hand, they affirmed the priority of "reverent attitude to labor necessary for the soul and body", based on the Orthodox culture. The tradition of self-valued attitude to work continued in the Soviet period in the labor proclamation as the first vital need. On the other hand, in Russia at all times, there has been a tendency to exploit labor which forms an instrumental attitude toward it. The contradictory attitude to labor is reflected in folklore: "Only fools and horses work" and "Idleness rusts mind". So, there is an ambivalent attitude to labor (both instrumental and terminal) in proverbs which is reproduced in the life position of modern generation of Russian youth.

Consequently, in labor, the contradiction between the traditional and the modern is not reduced to the opposites of meanings between the terminal and instrumental attitude to it. On the contrary, terminal and instrumental meanings are present in both traditional and modern attitudes to labor. The contradiction is created as a result of the values' bifurcation which forms dialectical opposites in the form of traditional and modern labor values which are the source of development and labor, and the youth's attitude to it.

In *family* relations, the analyzed contradiction is even more clearly manifested in the bifurcation of the relationship to the family into terminal (traditional) and instrumental

(modern). The family is traditionally considered a terminal value which is confirmed by the research results. Self-valued attitude to the family is typical for 86.3% of youth, and instrumental – for 13.7%. The contradiction arises between the traditional and modern attitude to the family as dialectical opposites manifesting itself in various forms of its organization – types of marriage relations, ways of gender distribution of roles, the desired number of children, attitude to children, etc. Let us consider how the terminal and instrumental youth's attitude to the family is related to various forms of its organization (*Tab. 6*).

The analyzed forms of family organization are divided into traditional and modern. Traditional forms include "married in church and civil officially registered marriage", "husband is the head of the family", "multi-children family", "authoritarian attitude to children", modern ones are "unregistered marriage (cohabitation)", "equal distribution of roles in the family", "one-child family", "liberal attitude to children". Among the youth who share a terminal attitude to the family, 86.2% support traditional forms of its organization, 75.0% – support modern forms; among those who share instrumental attitude the figures are 13.8% and 25.0%, respectively. As we can see, the terminal attitude to the family, inherent in the traditional culture of Russians, contributes to the predominant reproduction of traditional forms of its organization by young people, and instrumental – modern ones, so the basic contradiction in this area is manifested in the struggle between traditional and modern forms of youth's attitude to the family which in everyday life often leads to family conflicts. According to many sociologists, this struggle has caused the family crisis as a social institution. To the question "Do you agree with the statement that modern Russian society is experiencing a family crisis?" 21.4% of respondents answered in the affirmative, 52.3% of youth rather agree.

Thus, the analysis made it possible to determine the general and special in the contradictions of the traditional and the modern in the self-regulation of various spheres of youth's activity. The general idea is that the contradictions analyzed are based on a split attitude toward education, labor and family. It forms dialectical opposites in the form of the traditional and modern values. The special thing is reflected in the ways of resolving contradictions, while contradictions that have not been resolved do not lead to development. In education, this was manifested in its ineffective reform which resulted in the devaluation of traditional education

Table 6. Relation of terminal and instrumental attitude to the family with its organization forms

Attitude to family	Family organization forms, % of the respondents' number							
	Type of marriage relations		Distribution of roles in family		Desired number of children in family		Attitude to children	
	Officially registered marriage	Un registered marriage	Husband is the head of the family	Equal distribution of roles in the family	One-child family	Multi-children family	Authoritarian attitude toward children	Liberal attitude toward children
Terminal	86.2	75.0	85.3	57.1	80.4	90.6	82.7	69.7
Instrumental	13.8	25.0	14.7	42.9	19.6	9.4	17.7	30.3
Source: own calculation.								

values. In labor, in the current conditions, the historical instrumentalization trend of its value has increased the contradiction between traditional and modern attitudes to labor. In family, the contradiction manifested itself in the inconsistency of the youth's desire for modern forms of family organization with the traditional forms dominating in society which led to the development of contradictions into conflict. It means that what is special in resolving contradictions is different forms of harmony violation between the traditional and the modern in the activity self-regulation in its various spheres. Given the special role of young people in social reproduction, contradictions in the self-regulation mechanism of their activity arise between tradition as simple reproduction and innovation as the basis for social change.

Contradiction between the objective and the subjective in the construction of youth's social reality

In *education*, the opposition between the objective and the subjective is expressed in the contradiction between the educational status (education level) and satisfaction with the acquired knowledge (*Tab. 7*).

The table 7 shows contradiction between the education level that youth achieved and dissatisfaction with the gain knowledge. 21.7% of respondents are not satisfied to varying degrees with secondary general education, 35.2% – with vocational secondary education, 23.2% – with bachelor degree, and 21.4% – with master degree. In other words, the subjective ideas and youth's expectations are in conflict with their objective position in education. On the one hand, it appears in a real decline in the education quality. It is associated with the reform consequences which are reflected in the decrease in purchased educational status, and dissatisfaction with received knowledge which becomes a stimulus to young people to overcome contradictions.

In *labor*, contradiction arises between the conditions, nature, and labor content in various production areas (objective side) and the youth's expectations (subjective side). Essentially, this contradiction is between the real situation of young people employed in different production areas and the way of labor they construct. Let us analyze how objective labor conditions in material, spiritual production, social services, distribution and exchange are related to the youth's expectations from working in these areas, and the assessment of their own capabilities in realizing these expectations (*Tab. 8*).

The analysis of data in table 8 shows that the youth's expectations from their own work and the possibilities of their implementation differ significantly depending on the actual working conditions in different production areas. Contradictions arise in all areas where expectations do not coincide with the capability assessment, as evidenced by the high respondents' proportion who rated them on

Table 7. Relation of education level to knowledge satisfaction

Education level	Knowledge satisfaction, in % of the respondents' number				
	Fully satisfied	Rather satisfied	Rather unsatisfied	Unsatisfied	Can not say
Secondary general	12.3	48.6	15.9	5.8	17.4
Vocational secondary	12.0	32.8	24.0	11.2	20.0
Higher, bachelor degree	17.9	39.3	16.1	7.1	19.6
Higher, master degree	11.8	56.9	15.7	5.7	10.0
Source: own calculation.					

Table 8. Relation of objective labor conditions in various production areas to youth's expectations and capabilities for their implementation

Production area	Expectations, %*				Capability assessment, % of the respondents' number							
	Get an interesting job	Improve professional skills	Raise salary	Rise through the ranks	Get an interesting job		Improve professional skills		Raise salary		Rise through the ranks	
					A**	B***	A	B	A	B	A	B
Material production (industry, agriculture, transport)	20.0	38.8	85.0	22.5	58.8	41.2	53.1	46.9	53.2	46.8	66.9	33.1
Spiritual production (culture, education, science)	84.0	48.0	68.0	24.0	78.0	22.0	82.0	18.0	62.0	38.0	64.0	36.0
Social service (healthcare, jurisprudence, law protection activity)	22.9	37.1	71.4	34.3	51.5	48.5	59.9	40.1	39.9	60.1	49.9	50.1
Distribution and exchange (financial and banking activity, service industry, trade)	31.6	34.2	78.9	34.2	59.2	40.8	61.9	38.1	56.6	43.4	56.4	43.6

* In total, it is more than 100%, as the choice of several answer options was allowed.
**A – capabilities above average level; ***B – capabilities below average level.
Source: own calculation.

a seven-point scale below the average level. To the greatest extent, they appear in social service in relation to expectations of salary increases (71.4%) and estimates of the possibilities of their implementation below the average level (60.1%). In material production, due to the expectations of improving their professional skills (38.8%) and the capability assessment below the average level (46.9%). Thus, the contradictions between the objective position of young people in labor and their subjective expectations reflect the most relevant and significant aspects of self-regulation of their labor activity.

In *family*, this contradiction manifests itself in the most general form, between the desired and the actual. In particular, we can analyze it by comparing the desired number of children (the subjective side) with the actual one (the objective side). According to the research, among youth aged 25–29 years, 5.7% are focused on a childless family, one-child – 23.6%, two-child – 57.9%, three-child and more – 12.9%. In fact, the family composition in this age group is as follows: no children (39.3%), one child (45%), two (15%), three or more (0.7%). Consequently, family planning was not implemented, and even in the older age group (30–39 years) in which 19.9% of childless families, 41.9% – one-child families, 34.3% – two-child families, and 3.8% – multi-children families. It means that the reality makes its own adjustments increasing the contradiction in the self-regulation of relations in the family.

Thus, the analysis of contradictions between the objective and the subjective in various youth's activity areas spheres showed that, on the one hand, they reflect the existing problems of objective reality which are significant factors of activity self-regulation, on the other hand, youth's subjective attitude to these problems, the adequacy degree of which depends on the choice of means and ways of implementing the emerging contradictions. Despite the various problems, the common feature in the implementation of this type of contradictions is the formation of youth's active life position

as a condition for the becoming of their social subjectivity.

Contradictions as a source of development in the self-regulation mechanism

The analysis shows self-regulation as a developing process identifying the fundamental contradictions that are the sources of development of youth's activity. Understanding that the essence of development is in the opposites formed as a result of the bifurcation of interrelated elements of the socio-cultural self-regulation mechanism. In accordance with the law of unity and struggle of opposites, "...all human activity forms are carried out by splitting the one into different and opposite, and, on the one hand, the interaction of opposite forces characterizes a certain system as something unified. On the other hand, this interaction constitutes an internal impulse for its change and development" [1, p. 241].

Contradictions arise in the structures formed in the process of elements interaction of the socio-cultural self-regulation mechanism. These structures represent the unity of the mechanism elements that are different in their functional orientation and opposite in their semantic content. In the interaction of different and opposite sides of the elements in the educated structures, there is a source for the development that determines the self-regulation orientation of youth's activity in education, labor, family, and other spheres.

In the contradiction between the cultural and social aspects of the mechanism elements, the opposites are distinguished, reflecting the implementation of the conservative and constructive functions of culture in interaction with social conditions in various spheres of youth's activity. Depending on social conditions, young people choose life strategies aimed at sustainable development (implementation of the culture conservative function) or changes (implementation of the constructive function).

In the contradiction between the structures of the collective unconscious and the rational foundations of self-regulation, the opposite sides are formed through the bifurcation of values appeared in the transition process from unconscious to conscious forms, into terminal (values-goals) and instrumental (values-means). In this regard, the source of development is opposites which, on the one hand, are the meanings reproduced by youth in the archetypal and mental features of the collective unconscious and fixed in consciousness in terminal values. On the other hand, it is the meanings presented in instrumental values which are the result of everyday experience accumulated in youth's diverse interactions. If in the first case the value is the object of self-regulation itself (it is also the goal of self-regulation), then, in the second case, the object is evaluated as means to achieve these goals. In the confrontation of opposite meanings, the corresponding orientation of youth's development is determined, based on the self-valuable (terminal) or instrumental attitude to the objects of the surrounding reality in various spheres of its activity.

The bifurcation of values into terminal and instrumental also underlies the *contradiction between the traditional and the modern* in the self-regulation of various spheres of youth's activity. Inheriting the culture created by the previous generations, young people reproduce the traditions typical for it. The traditional terminal attitude to the objects of social reality is due to the fact of the existence of a self-valuable attitude to family, knowledge, and labor in the past, and reproduction which youth confirm by the research results. At the same time, the studies show a growing trend of instrumentalization of attitudes to various

objects of reality in current conditions which is a consequence of the implementation of an innovative social and group function. Therefore, traditions and innovations are the opposite sides in the contradiction between the traditional and the modern. The dominance of traditions contributes to the orientation of the self-regulation process to a simple reproduction of the main spheres of youth's activity, and innovation – to an expanded, ensuring its social development.

In youth's activity self-regulation from the standpoint of phenomenological sociology of knowledge, the *contradiction between the objective and the subjective* is considered the entity bifurcation of social reality in objective reality and designed young people's own reality. On the one hand, the resulting opposites are the youth's social position in various spheres of their activity. On the other hand, it is the designed image of reality in these spheres. In this case, the source of development is the discrepancy between the youth's expectations associated with the real and designed social status. In its extreme manifestations, it takes on equally destructive forms, in overestimated expectations that lead to disappointments and in underestimated expectations that limit their implementation possibilities.

All the controversies are the source of development, not in themselves, but in the process of their resolution. Their necessary conditions are consensus achievement, reasonable compromise, and search for alternative solutions aimed at harmonizing the opposite sides of the contradictions ensuring the self-regulation development of youth's activity.

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Received October 7, 2020.

DOI: 10.15838/esc.2020.6.72.14
UDC 316.4, LBC 60.524

Sociological Analysis of Human Capital Factors and Resources*

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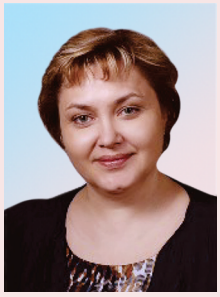

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Abstract. The relevance of the study is due to the lack of a single position in the scientific, state, and public discourse on the accumulation, development, and implementation of human capital. The article deals with the theoretical concepts of human and social capital, its main components; it presents the results of studying the dynamics and structure of socio-economic well-being and human capital resources. The sociological analysis is carried out by measuring social well-being of the population (the case of the Tyumen Oblast), namely its key components: the degree of life satisfaction, social optimism and protection from the main social dangers, generalized trust and trust in institutions. The authors have considered human capital resources through self-assessments of health, material well-being, health, education, status, and work motivation. As an empirical base, we used data from monitoring studies (2006–2019) conducted within the framework of the all-Russian project "Socio-Cultural Portraits of the Russian Regions".

* The work was supported by the Russian Foundation for Basic Research (grant no. 19-29-07131 "Modeling and measuring human capital and its manifestation forms in the context of digitalization of the economy: resources, flows, institutions").

For citation: Romashkina G.F., Khudyakova M.V. Sociological analysis of human capital factors and resources. *Economic and Social Changes: Facts, Trends, Forecast*, 2020, vol. 13, no. 6, pp. 232–251. DOI: 10.15838/esc.2020.6.72.14

We used the index method, correlation method, factor and variance analysis in the study. The results obtained made it possible to give a general assessment of the processes of human capital resources development, to identify the contradictions in the public consciousness, to determine the relationship between human capital resources and social capital. In particular, the research showed that social capital is associated with the citizens' feeling protection from the main problems and dangers, and it has a weak but statistically stable connection with the components of social and material well-being. The authors note that life satisfaction, social optimism, self-esteem of protection from problems and dangers and trust in institutions increase with the growth of family's material security. Achievement motivation, which is a necessary condition for the development of human capital resources, is currently not related to the status of a respondent, his or her material wealth and social capital.

Key words: human capital, social capital, social well-being, life satisfaction, social optimism, social security.

Introduction

The issues of accumulation, development, and realization of human capital today are among the most discussed at all levels: scientific, state, and public one. Attention to human capital is historically attributed to the works of J. Mincer [1], T. Schultz [2], G. Becker [3], where it was considered through investments in a person that increase his or her ability to work (including education, professional skills, and health) [4; 5; 6].

The concept of human capital also includes consumer spending (food, clothing, housing, education, health, culture) and government spending for these purposes[1], designating the specified body of research as "cost" or "investment" approaches.

In this article, we base on the resource approach to measuring human capital, when the resources that people possess are considered key ones for achieving economic and other important results. This determines the importance of micro-level measurements [7]. Human capital, in turn, serves as a resource for development and competitiveness, as N. Olimpia justifies it in the EU countries review [8].

In economic and sociological concepts, human capital was interpreted as a set of professional knowledge, skills and abilities acquired in the process of education and advanced training. While P. Bourdieu did not distinguish the concept of human capital from the forms of cultural capital [9], J. Coleman considered it through the prism of rational choice, and M. Granovetter analyzed it in the sociology of labor markets [10].

Russian researchers did not stay away from the discussion. According to V. Radaev, in the situation with human capital, science deals with reflexive knowledge, designed to translate the development of new skills, institutionally supported by a system of formal certificates, diplomas, grades, etc. This knowledge is associated with the socio-professional stratification system, for example, certificates open access to certain types of economic activity [11, pp. 26–27]. The labor market was systematically studied by R.I. Kapelyushnikov and V.V. Potapenko through the tools of human capital [12; 13; 14]. V.E. Gimpelson concluded that the structural features of the Russian labor market are identified within the framework of the investment concept of human capital value assessment [15].

[1] *World Bank World Development Report: The Changing Nature of Work,* 2019. Available at: https://www.worldbank.org/en/publication/wdr2019

Human capital was considered as an integral sum of several components, such as health, knowledge, culture and individual freedom at the micro-level [16], as well as a resource for the development and modernization of the economy [11; 17]. The results obtained by the researchers were different in their degrees of success and demand. However, we again find conditional poles: the micro- /macro-level ones by the data source and the soft / hard ones by the method of building models.

These approaches are not free from drawbacks. For example, there is no stable empirical evidence for the theoretical assumptions that the accumulation of individual attributes of human capital leads to the expected economic and social returns at a certain level of aggregation. P. Wright and G. McMahan suggested that motivation can bridge the gap between skills and behavior [18]. On the one hand, it seems most promising to consider stable characteristics, such as intelligence, personality and physical attributes, on the other hand, flexible characteristics, usually measured through human behavior, are no less important, taking into account knowledge and skills that can change but remain fairly stable after acquisition [19]. The dynamic aspect of the problem including the concepts of "change", "accumulation", "development", and "return" is also significant.

According to E. Rory, A. Crocker, the studies on human capital resources should be enriched by the consideration of social relations. The concept of social capital is particularly useful here. The authors explain that the social capital of a single (internal) level coexists with the resources of human capital (knowledge, skills, abilities, and other characteristics), and for their strategic use, people can get access to external social capital [20].

A significant amount of literature on the theory of social capital does not create a unity of the concept's practical applications. In P. Bourdieu's structuralist constructivism, social capital is characterized through the totality of all types of real or potential resources associated with belonging to a group and involvement in a stable network of social ties [9]. Social capital in this case is created in the interactions of actors in social fields and is structured according to their actual advantages and resources. At the same time, R. Putnam emphasized the importance of trust, networks, and the related norms of reciprocity [21], and F. Fukuyama included a system of informal rules and social norms in the concept [22]. J. Coleman emphasized actor's rationality when choosing trust relationships as a good [23].

Many subsequent studies conducted using various methods confirm the heterogeneity of social capital [24; 25; 26]. Moreover, there is no generally accepted structure of social capital in science to measure it, but it always includes trust which can be generalized and/or institutionalized.

We will not discuss the possibilities of measuring social capital, including trust as a factor of human capital, while agreeing on the limited sufficiency of this measure. Let us note that generalized trust which is understood as trust in strangers is often interpreted as an individual resource [27], and institutional trust is often interpreted as a social result [21]. In this case, we have adopted the principle of minimality for creating search models.

Thus, the analysis of the world and Russian studies on human capital reveals insurmountable gaps between theoretical and empirical results. In addition, it is still unclear how the dynamic aspect is considered; the form of identifying the return on human capital is

also not obvious. The focus of our research was directed to the detection of these problems.

The multilevel approach implies that the individual resources of human capital include accumulated education, health, status at work, income and labor motivation as a willingness to work putting the maximum effort. The accumulation of human capital at the meso-level (firms, region) is influenced by various external factors. We did not purpose measuring human capital directly in the form of a single index in our work. We show that a single index of human capital is not informative due to the incoherence of its individual components. For human capital resources development, a favorable environment is created by social capital as an asset embedded in the relationships of individuals, communities, and networks. We consider the concept of social well-being at the meso-level as a social return. We assume that average assessments of social well-being and trust in government institutions increase in a prosperous society, but this relationship does not always have a micro-level effect.

The research **purpose** is to identify the features and significant factors in the development of human capital resources. The research **objectives** include the analysis of the main resources of human capital; measurement of basic components of social well-being; determination of the level of trust in social institutions and generalized trust affecting the resources of human capital; explanation of factor structuring components of social well-being and human capital.

Scientific problems

Science has moved **a**rom direct measurement of the amount of accumulated wealth in monetary units to the study of human capital specific qualities and aspects, which can be shown by the results of research presented by A.O. Akulov and N.A. Shepeleva [28]. N.E. Tikhonova determines economic, qualification, power, symbolic, cultural, and personal types of human capital resources [29]. O.I. Shkaratan divides human and other types of capital [30]. According to V.A. Davydenko, the theory of human capital is involved in the study of the stratification of society through indicative, complex or integral approaches [31].

In the Russian scientific discourse, the question of who is responsible for the accumulation of human capital resources is relevant. On the one hand, the state should provide the necessary conditions for this. N.I. Lapin, V.A. Ilyin, M.V. Morev made a conclusion about "the stagnant weakness of Russia as a social state" and the need to move to a "humanistically oriented social state" [32, p. 15]. On the other hand, citizens who are independently responsible for meeting their basic needs should be active and motivated to work. V.V. Karacharovsky and O.I. Shkaratan showed that people perceive the need for essential benefits differently. The main one is the need for "humanitarian benefits" and "protective benefits" that provide state functions, as well as "industrial benefits" that ensure the society's functioning and development [33, p. 27]. The results of our study indirectly confirm the validity of these postulates.

According to the generally accepted point of view, the main channel of human capital development is education [18; 34; 35]. Numerous reforms of the education system aimed at its "modernization" have not led to systemic improvements. Currently, the Russian education system poorly performs the functions of forming modern human capital [36, p. 150].

Studying the Russians' level and quality of life in the conditions of periodic crises, the researchers of the Institute of Sociology of RAS have noted that the segments of the population secured with resource are able to withstand the pressure of economic fluctuations, which is

based on investments in human capital (while maintaining the satisfaction of their basic needs) [37, p. 15–17]. This conclusion is also important for the purposes of our analysis.

Methodology and methods

The study is based on data obtained over 15 years in the framework of the all-Russian project "Socio-Cultural Portraits of the Russian Regions", the methods and results of which were published earlier [38, pp. 243–250, 305–310]. The research methodology and the justification of the sample structure are given in detail, for example, in the collective monograph [39, pp. 67–74], a number of sample characteristics are presented in *insert 1*.

The structure of the main components is described in *insert 2*. The study included self-evaluation of material-wealth (1) (hereinafter – the material well-being), evaluation of social well-being: life satisfaction (2), social optimism (3), and the degree of security from main social hazards (4). Social capital includes generalized trust (5.1), level of citizens' confidence in basic social institutions (institutional trust) (5.2). The concept of social capital is not limited to trust, including the density and coverage of social connections, but these important indicators were not used in this article.

Evaluation of human capital (hereinafter – HC) has been carried out through indicators of education (6), self-assessment of health (7), number of subordinates (8) and type of work motivation (9). HC resources at the micro-level include indirect assessment of income the level of which is determined by using conditional scale fixing the respondents' self-assessment of their material well-being (*Tab. 1; Insert 3*). We used the measuring of social well-being of the population; the interest in these issues is always in the focus of research by Russian sociologists. The methods of metrics calculating significantly depend on the researchers' goals [40; 41, p.66; 42; 43, p. 59; 44]. We understand social well-being as an integral characteristic that combines life satisfaction in general, social optimism and a sense of security (see insert 2).

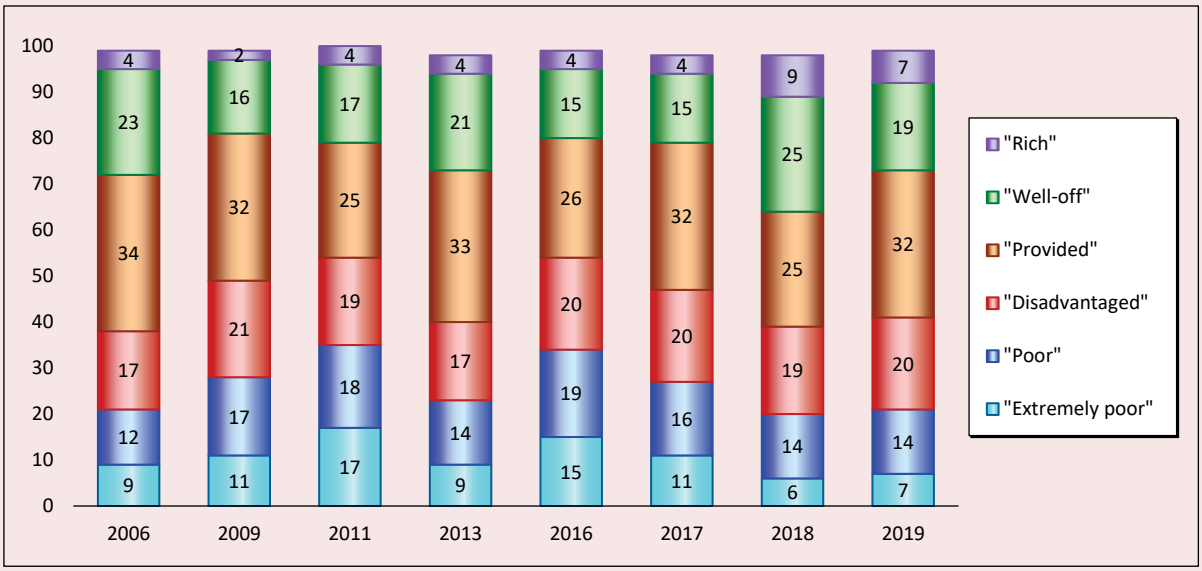
For the analysis, we used the index method, correlation (according to Spearman), significance testing according to the ANOVA table, factor analysis, and classification based on the analysis of variance.

Our main hypothesis is that there is a mechanism for the accumulation and development of human capital, which involves the creation of an environment with open social elevators, and trusting relationships are supported by society. Factors of human capital at the meso-level are social well-being and social capital. However, it is difficult to separate factors and effects in public relations. We assume that there is a mutual influence between them. HC resources are affected by the level of generalized trust, understood as trust in strangers in general. The level of trust in the system of institutions is the result of well-functioning public relations. The second-level hypothesis is that the resources that people directly possess (education, age, health, and achievable work motivation) play an important role in the effectiveness of this mechanism.

Scientific results and discussion

The main components of human capital, social well-being, and social capital in dynamics for the period from 2006 to 2019. Based on an in-depth study of social stratification in Russia, L.A. Belyaeva concluded (data for 2016 are given) that "conditionally disadvantaged strata of society" (the first three lower strata) accumulate 51% of the country's population, and 44% are prosperous [45, p. 95]. In the Tyumen Oblast, according to the population's self-assessments, the lower segment is much narrower: the low-income strata make up 42%, while 58% assess their resources as sufficient (*Fig. 1*). The dynamics of the material standard of living in the region during the entire

Figure 1. Dynamics of self-assessments of the population segments' well-being, 2006–2019, % of the respondents' number



Source: own calculation based on the data of socio-cultural monitoring in the Tyumen Oblast.

observation period is more prosperous than the average for Russia. In the crisis-stagnant years (2011, 2016), the financially disadvantaged stratum included 54% of the region's residents. But even in the most "prosperous years", when Russia's budget was overflowed with "oil money", this segment did not make up 38%, which means that more than a third of the inhabitants of a relatively prosperous region of Russia practically did not benefit from the "oil boom".

Considering the resources of human capital according to the components indicated above, we should note the following.

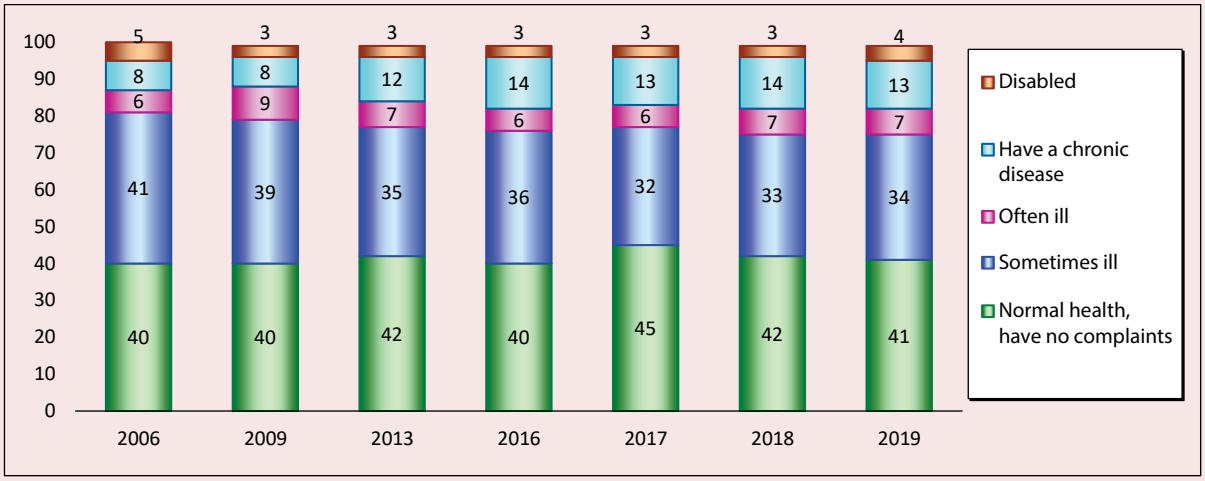
The all-Russian trend of population ageing is also typical for the Tyumen Oblast. Over the past ten years, the share of people of working age in the region has decreased by 7.6% (65.1% in 2006; 57.5% in 2016), the share of the older generation has increased by almost 4% (17.6% in 2006; 21.4% in 2016)[2]. According to the population's self-assessments, slightly more than 40% of the Tyumen Oblast's residents believe their health is "normal", they do not complain of diseases, and this indicator does not change much throughout the entire period (*Fig. 2*).

Statistical data confirm the results of empirical studies. During 2018, less than 40% of the adult population did not apply to health care centers. The number of diseases detected for the first time decreased significantly (by 22%). If in 2006, 824 cases of diseases per 1000 inhabitants were detected for the first time, then this figure was 639 in 2018. The number of disabled people has decreased by 7%[3].

[2] *Tyumen Oblast: Stat. Coll.* (except for the Khanty-Mansi Autonomous Okrug – Yugra and the Yamalo-Nenets Autonomous Okrug). In 2 parts. Part I (I) (1990–2016). Office of the Federal State Statistics Service of the Tyumen Oblast, the Khanty-Mansi Autonomous Okrug – Yugra and the Yamalo-Nenets Autonomous Okrug. Tyumen, 2019. P. 121.

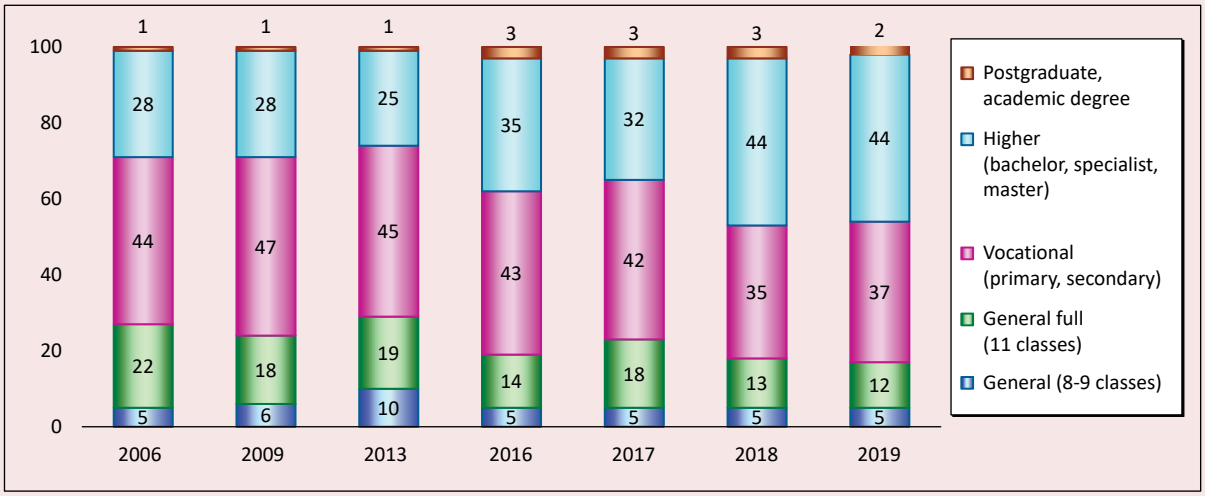
[3] *Tyumen Oblast: Stat. Coll.* (except for the Khanty-Mansi Autonomous Okrug – Yugra and the Yamalo-Nenets Autonomous Okrug). In 2 parts. Part I (I) (1990–2016). Office of the Federal State Statistics Servicef of the Tyumen Oblast, the Khanty-Mansi Autonomous Okrug – Yugra and the Yamalo-Nenets Autonomous Okrug. Tyumen, 2019. Pp. 284–290.

Figure 2. Distribution of responses to the question "How do you assess your health?", 2006–2019, % of the respondents number



Source: own calculations based on the data of socio-cultural monitoring in the Tyumen Oblast.

Figure 3. Distribution of answers to the question about the level of education of the Tyumen Oblast residents, 2006–2019, % of the number of respondents



Source: own calculation based on the data of socio-cultural monitoring in the Tyumen Oblast.

Modern economic development requires a higher level of professional training in most jobs. This trend determines an increase in the share of people with higher education, and at the same time a decrease in those who has limited to a lower level of education and vocational training (*Fig. 3*).

Thus, compared to the beginning of the period (2006), the number of the region's residents with higher and postgraduate education increased almost 1.5 times[4]. A positive impact on HC resources is provided by the presence of an achievable work motivation

[4] *Regions of Russia. Socio-Economic indicators. 2019*. Appendix to the collection. Available at: http://old.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1138623506156 (accessed: September 18, 2020)

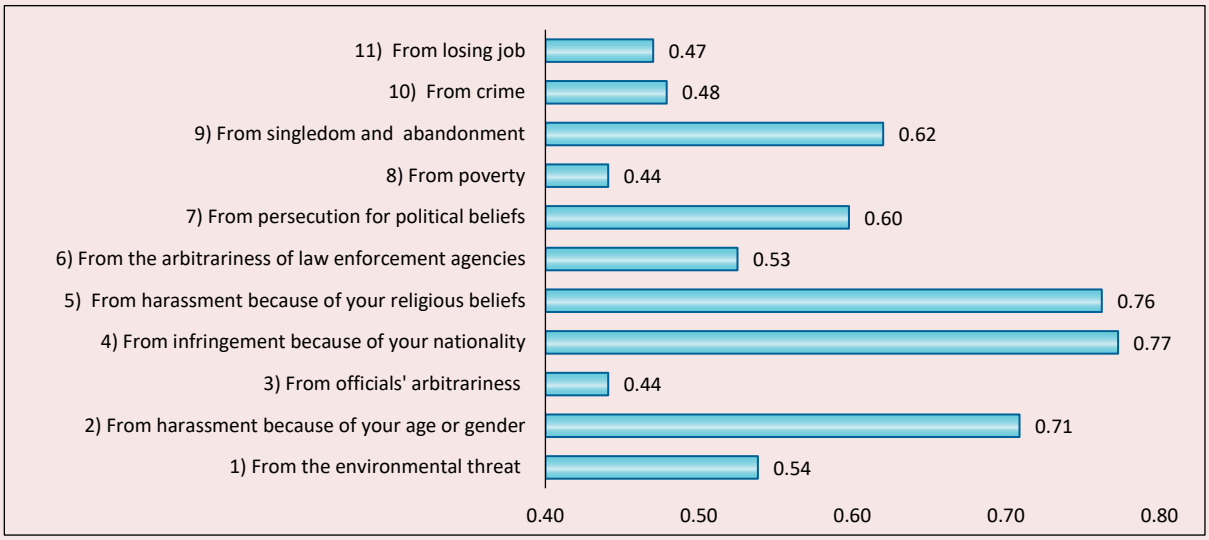
among the majority of employees. If, according to the results of the 2006 monitoring study, 48% of respondents were assigned to the group of "achieving success" motivation type, then by 2019 their share increased to 70%. The majority (83%) of people are satisfied with their work (46% are quite satisfied, 37% are rather satisfied). A little more than a third of the respondents (32%) would like to keep their position (we should note that a third of respondents have subordinates in the main job); a fifth (21%) are ready for promotion and taking more responsibility according to their own estimates, and the same number (21%) would like to start their own business. Economic instability makes people searching for certain guarantees. Thus, during the study period, the proportion of those who would prefer to have a small but solid income and confidence in the future increases (from 42% in 2006 up to 51% in 2019), and the share of people who are ready to earn a lot without guarantees for the future is decreasing (28 and 19% in 2006 and 2019, respectively).

Let us move on to the characteristics of social well-being. The first component of the social well-being index is the degree of satisfaction with life in general. In the Tyumen Oblast, this indicator has increased: the share of people who are satisfied with their lives (the answer options "fully satisfied" and "rather satisfied") increased from 49% in 2006 to 68% in 2019, and the average life satisfaction index was LsI = 0.69.

Let us consider the structure of the region residents' protection index, the basis for calculating which is the respondents' answers to the questions (*4, Insert 2*) about the 11 most urgent problems and dangers (*Fig. 4*).

The main problem of Russian citizens, recorded in all studies after the 1990s, is poverty. However, in the 2000s, the officials' arbitrariness was added to it: in the Tyumen Oblast, the level of severity of this problem reached 0.44. Next in terms of relevance are the problems of crime (PI = 0.48) and losing job (PI = 0.47). The latter is important for further analysis.

Figure 4. Structure of the protection index, 2019
(Protection Index – PI) on a scale from 0 (all completely unprotected) to 1 (all fully protected)



Source: own calculation based on the data of socio-cultural monitoring in the Tyumen Oblast.

On average, the protection index for the 11 problems listed is 0.58. Thus, the actualization of the first level problems (ensuring life) reduces the importance of humanitarian problems for people. These aspects will be discussed in our following works.

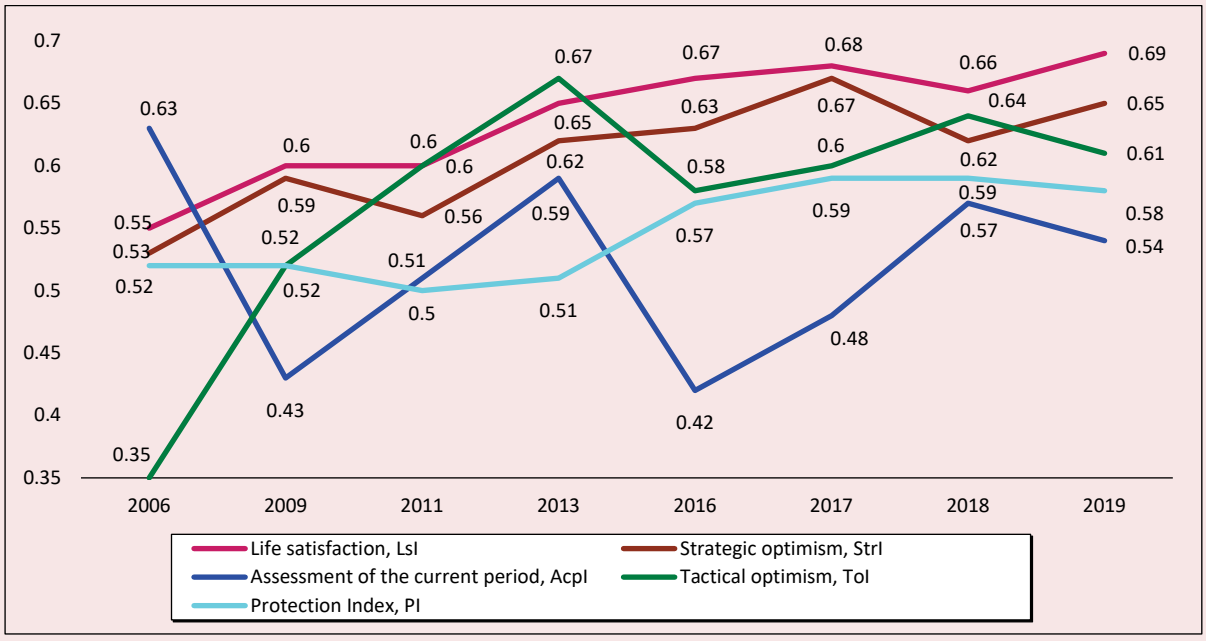
Low-income populations consider themselves to be the most vulnerable groups ("extremely poor" and "poor"), their PI is 0.48, as well as people over 54 years of age (PI = 0.46). Rich people feel the most protected (PI = 0.7). Compared to previous years, the spread in estimates between the extreme lower and upper layers in terms of material well-being has significantly increased (0.15 in 2018 and 0.22 in 2019). That is, there is a growing spread in the estimates of the components of social well-being between the lower and upper layers of the social pyramid.

According to our data, the lowest estimates of the dynamics of the current situation were given in 2009 (0.43) and 2016 (0.42), while the share of those who hope for improvements in the next year is increasing. But as soon as the economic situation levels out, people stop expecting their situation to improve in the near future. Strategic optimism of our citizens remains high, it is similar to the dynamics of overall life satisfaction in general (*Fig. 5*).

There are little differences in the type of settlement and gender factor in the structure of social optimism and life satisfaction indices. The most elastic index of life satisfaction in terms of social structure increased sharply in the group of the richest (LsI = 0.88) and decreased in the group of the least provided (LsI = 0.48). The protection index is the least elastic, but it also increases with the growth of the material standard of living.

Statistically significant is the drop in the level of education and qualifications of a person, which affects the decline in his or her social well-being. Here we may observe the connection between the HC resources and

Figure 5. Dynamics of the social well-being index components, 2006–2019

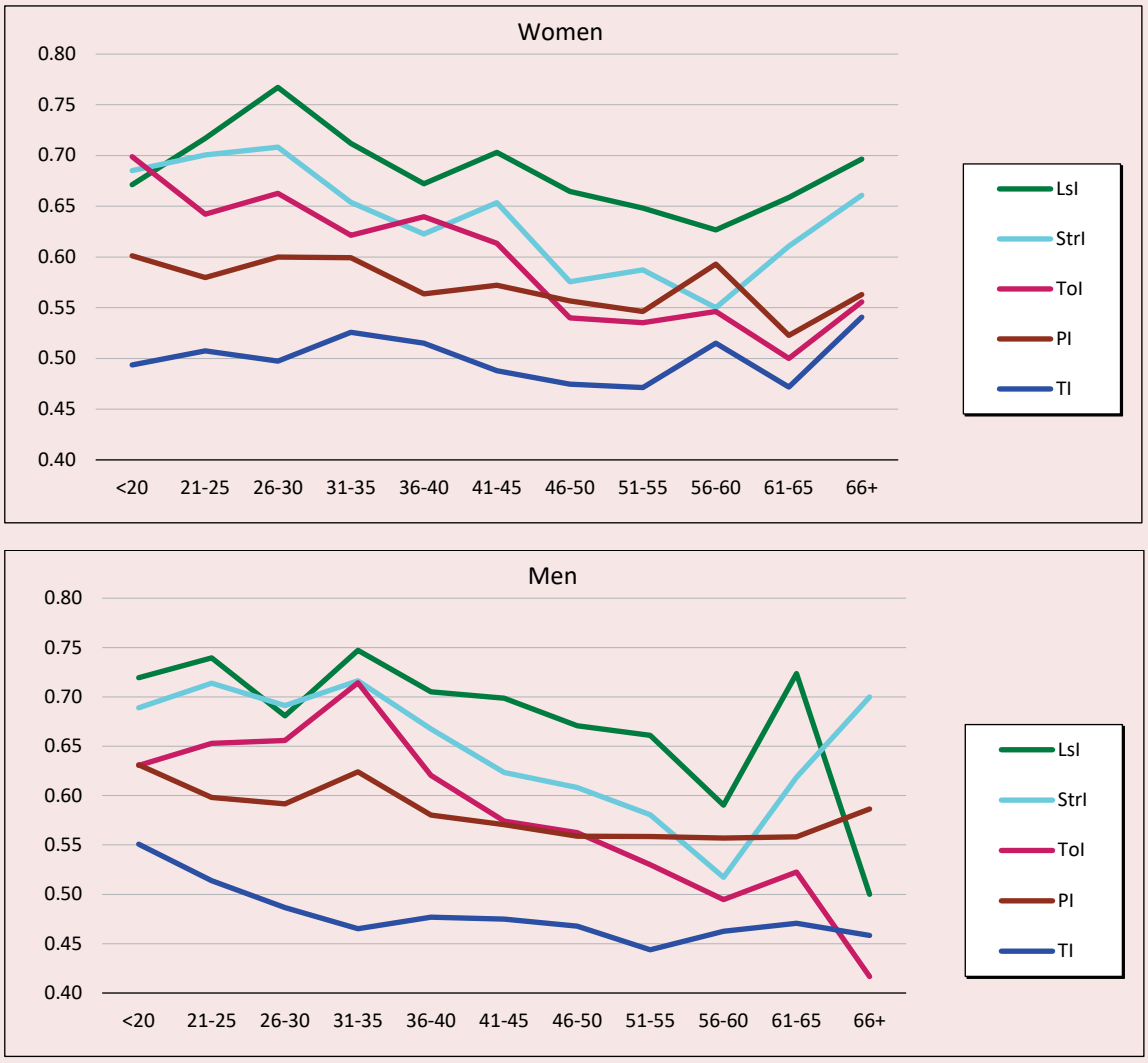


Source: own calculation based on the data of socio-cultural monitoring in the Tyumen Oblast.

social well-being. As expected, the social well-being index reaches its highest value in the upper social group. These differences are mainly due to the strategic levels of optimism and satisfaction with life in general. The ANOVA test[5] confirms the maximum statistical stability of differences in the social structure (material well-being) of the protection indices ($F = 21.5$, $p < .001$), social optimism ($F = 65.7$, $p < .001$), social well-being ($F = 61.3$, $p < .001$).

We should note a steady decline in all components of social well-being with increasing age (*Fig. 6*). Life satisfaction and social optimism especially sharply decreases in case

Figure 6. Dynamics of the components of the social well-being index (Swl): life satisfaction in general (Lsl), protection index (Pl), components of social optimism (Strl, Tpl, AcPl), trust in institutions (Trl) by age for men and women, 2019



Source: own calculation based on the data of socio-cultural monitoring in the Tyumen Oblast.

[5] The ANOVA test (analysis of variance) confirms the statistical stability of mean differences if $F > 10$, $p < 0.05$. $F > 10$, $p < 0,05$.

of men over 60 years old, women over 55 years old, while life satisfaction in general slightly increases. The failure of the protection index in case of women corresponds to the period of pre-retirement age (51–55 years old); in case of men, there are no such fluctuations and the protection index is consistently equal to 0.56, except for the oldest age group.

According to the first level hypothesis, the HC resources are affected by the level of generalized trust, and the level of trust in the system of institutions acts as a social result.

The dynamics of the levels of generalized trust and trust in institutions (measured by questions 5.1 and 5.2 of Ins. 2) are presented in *table 1.*

Trust changes very slowly in dynamics in society, but there are more of those who "do not trust" in our society than the "trusting". The level of generalized trust is most closely related to self-assessment of financial status, age, and self-assessment of health. Thus, according to 2019 data, the level of generalized trust is on average 0.54 in the "rich" group versus 0.41 in the "extremely poor" group. The highest level of generalized trust is among the representatives of older age groups (0.54 in the cohort of 61–65 years old, 0.43 in the group over 70 years old). But the fastest decline in generalized trust occurs on the scale of self-assessment of health (0.37 in the group "I have a disability").

The level of trust in institutions is significantly lower than the level of generalized trust. We should recall that the last indicator includes an assessment of trust in 16 civil society institutions (*Fig. 7*).

Employers are leading in the structure of trust. This trend is typical for the whole world. The Internet media and political parties are dragging behind, which is also quite consistent with the data of the world sociological agencies research.

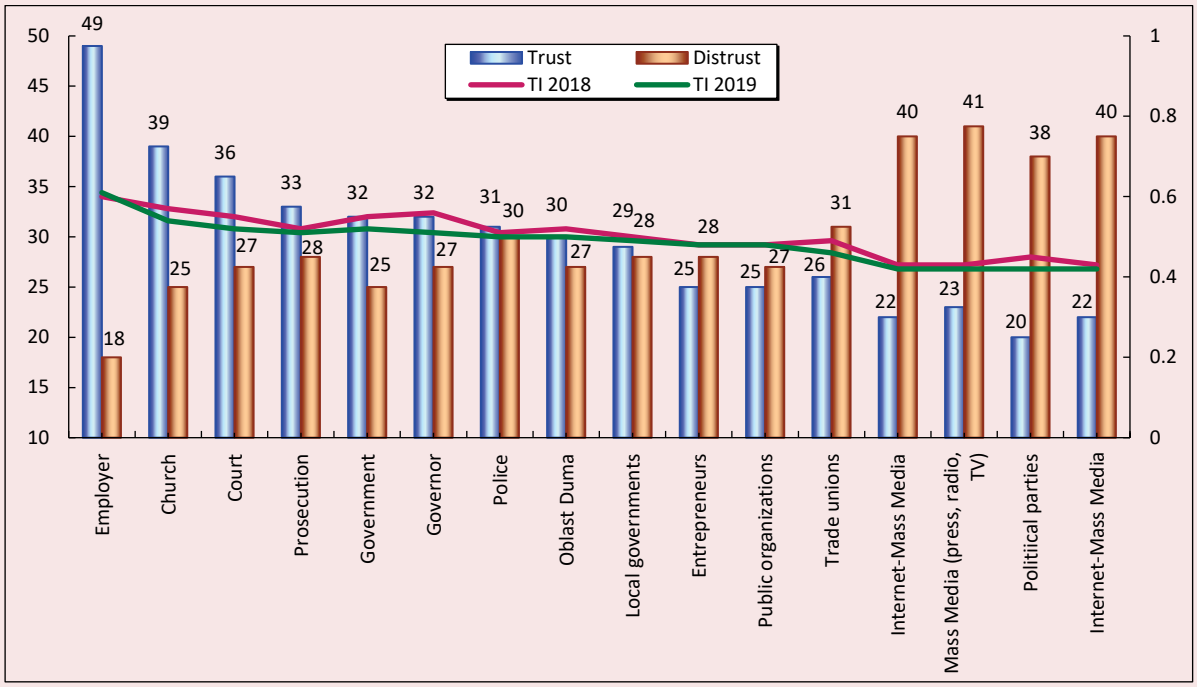
Let us consider the results of a factor analysis aimed at identifying the relationship between the components of human capital, social well-being, generalized and institutional trust (a total of 14 components, see insert 3). In addition to the above mentioned, we used the concept of achievement motivation in the analysis. The identification of motivation types was justified earlier [46, p. 152]. We have chosen the method of K-means with rotation, normalization of initial indicators, allocation of principal components by Kaiser. The factor analysis algorithm is constructed in such a way that the structure of latent factors in the original multidimensional space is further subjected to the rotation procedure to achieve the maximum approximation to orthogonality (for example, see [47, p. 87]). Thus, the main components actually reflect the internal (latent) interdependencies between the indicators included in the analysis, their ranking according to the degree of significance in the final factor structure. Orthogonality is proved by the absence of a relationship

Table 1. Dynamics of average values of trust assessments, Tyumen Oblast, 2006–2019, % of the number of respondents

	2006	2010	2011	2013	2016	2017	2018	2019
Generalized trust*	-	-	-	0.46	0.45	0.47	0.47	0.47
Trust in institutions**	0.27	0.31	0.26	0.29	0.35	0.35	0.34	0.30

* The average level of generalized trust is shown on a scale from 0 – "even excessive caution will not hurt" to 1 – "most people can be trusted".
** The average level of trust in institutions is shown as the sum of the options "I fully trust" and "I do not trust", then they were averaged over 16 institutions (see fig. 7).
Source: own calculation according to the socio-cultural monitoring in the Tyumen Oblast.

Figure 7. Structure of the index of trust in institutions, index values in 2018, 2019



Source: own calculation according to the socio-cultural monitoring in the Tyumen Oblast.

between the principal components. The error of the method is manifested in the residual variance (remainder) and the presence of weak, but relationships between the factors. Quantitative error measures of the method (measure of adequacy and Bartlett's test) confirm the satisfactory suitability of the data for factor analysis at a significance level of $p < 0.001$ (*Tab. 2, Insert 3*). By the principal component method with Kaiser normalization, we have algorithmically identified four principal components (factors) (*Tab. 1, Tab. 3, Insert 3*). The obtained result explains 54.87% of the total variance. One of the secondary outcomes of the factor procedure is the ability to interpret the resulting factor through regression with the corresponding components and weight loads.

According to the factor analysis results, the components that are usually included in the HC (self-assessment of health, level of education, type of work motivation, self-assessment of material well-being) were assigned to different factors – the first, third and fourth (*Tab. 2*).

We should note that the obtained factors leave 45.13% of the variance unexplained and are not completely orthogonal. The largest share of errors is given by self-assessments of material well-being, level of education and status at work (number of subordinates).

Factor 1 reflects all three components of social optimism (0.748, 0.736, 0.683), life satisfaction in general (0.64) and self-assessment of health (90.55). It is believed that this is the main factor explaining the largest share of aggregate variability, in this case 19.69%. To the greatest extent, the first factor is associated with the level of social optimism. For the purposes of our work, it is important to emphasize that only self-assessments of health level, that is, the first individual resource of

Table 2. Main components of factor analysis with Kaiser normalization

	Factor 1	Factor 2	Factor 3	Factor 4
3.3 Tol	**0.748**	0.102	0.146	
3.2 Acpl	**0.736**			
3.1 Strl	**0.683**	0.387		0.211
2. Lsl	**0.64**	0.324		0.23
7. Health assessment	**0.55**		0.182	-0.175
5.2 Trust in institutions	0.188	**0.743**		
4. PI	0.28	**0.712**		
5.1 Generalized trust		**0.644**	-0.184	
9.2 If you have the opportunity to change jobs, what do you choose	0.14		**0.763**	
9.1 What job would you prefer		-0.116	**0.704**	0.23
Age groups	-0.262		**-0.646**	0.324
8. Do you have subordinates in your main job	0.179	-0.18	-0.191	**0.666**
6. Education	-0.218	0.16	0.324	**0.57**
1 Material well-being	0.438	0.171	0.113	**0.515**
Source: own calculation according to the socio-cultural monitoring in the Tyumen Oblast.				

HC, were included in human capital out of its traditional components. Self-assessment of material well-being (the second individual resource of HC) correlates with the main factor at the level of 0.438. At the same time, age and level of education are opposite in relation to the first factor. In other words, the first factor reflected the signs of higher social well-being, life satisfaction, and self-assessment of health, and it is more significant for younger and less educated respondents.

Factor 2, first of all, reveals people's perception of social capital components (generalized, institutional trust and protection from problems and dangers), explaining 13.17% of the total variance. This factor is not orthogonal to the first one, since there are correlations with strategic optimism (0.387) and life satisfaction in general (0.324). It is important to note that the connection of factor 2 with HC resources is very weak.

Within the framework of factor 3, variables characterizing the type of work motivation and the age of the respondent were grouped, including 12.46% of the total variance. Since factor 3 is negatively associated with age, the achievable type of work motivation is more typical for young respondents, whereas for older cohorts, the motivation to avoid failure is more pronounced [48]. Factor 3 is positively associated with the level of education (0.324). That is, the achievable type of work motivation increases for younger and more educated respondents. This factor is not related to the second and first factors. The latter means that an increase in the achievable type of work motivation is not reflected in a higher level of social optimism, social capital and self-assessments of material well-being.

Factor 4 links social status (number of subordinates and level of education) and material well-being, explaining 9.55% of the total variance. In addition, it is positively associated with age (0.324) and weakly correlates with the optimism factor.

Thus, the latent structure of human capital in the analyzed case is divided into three loosely connected components. Self-assessments of health, once in the first factor, are closely related to such indicators as positive social well-being and life satisfaction in general. Status, education, and material well-being included in factor 4 were orthogonal to factor 3, which accumulated the components of labor

achievement motivation. This negative factor syndrome is mitigated by positive trends in the growth of the average standard of living, life satisfaction in general, strategic optimism along with the components of factor 4. Self-assessments of health decrease simultaneously with the growth of factor 4.

The results of factor and correlation analysis confirm the truth of the hypotheses only partially.

Conclusion

The paper attempts to reveal the main contradictions of empirical studies on human capital. Above, we drew attention to the fact that the resources of human capital traditionally include accumulated education, health, status at work, income and labor motivation as a willingness to work putting the maximum amount of effort. At the meso-level, we have confirmed the positive dynamics of human capital resources. At the same time, different resources of human capital at the micro level demonstrate different structural relationships.

The theoretical significance of the research results lies in the approbation of an algorithm that allows aggregating human capital resources obtained at the micro level. And this, in turn, is of value for further analysis and interpretation of the results of applied research.

Theoretical concepts reflect the belief that developed human capital gives chances for higher economic and social results. If the results were considered at the macro-level, it was about differences in the development of countries, regions, depending on the reserves (or resources) of human capital. If the study was based on the micro-level, theoretical constructs assumed that the accumulation of human capital resources gives their carriers, citizens, competitive advantages in the fight for rare resources. We assumed that the mechanism of human capital development consists in a positive relationship between the resources of human capital, social capital and social well-being as cumulates of self-assessments of life satisfaction in general, optimism, and protection, which can be called a social result for the meso-level.

If we consider social well-being as a social result of HC accumulation, it would be logical to assume that the increase in the level of social well-being for the meso-level (in dynamics over the years of monitoring) is reflected in micro-level relationships.

The positive dynamics of self-assessments of material well-being, the level of education, and the achievable work motivation of society over the past 13 years allowed us to assume that human capital resources increased in the region which is considered to be relatively prosperous by Russian standards (the Tyumen Oblast). At the meso-level, simultaneously with the resources of human capital, social well-being, the need for protection from losing job, crime, poverty and officials' arbitrariness increased, the level of trust in institutions increased slightly, while the generalized trust remained unchanged.

During the observation period, the social stratification significantly increased, and therefore it was important to check how the resources and factors considered were expressed by social strata in different years of monitoring.

Life satisfaction, social optimism, a sense of security from the main problems and dangers and institutional trust increase along with the level of material well-being, which is especially relevant in the group of the most financially secure ("rich"). The index of generalized trust and the type of work motivation are not related to material well-being.

The level of education increases the self-esteem of the income level. Stable links between the level of education and the components of social well-being were not found in any of the monitoring waves. Weak correlations were rather reversed, but they fluctuated depending

on the wave, that is, education in our case does not work as a social elevator to the extent that theoretical constructions dictate to us.

The results of factor analysis partly confirm the above conclusions, partly expand the picture, given that the result is the construction of latent factors. Human capital resources are not built in the form of a unidirectional factor. Social optimism, life satisfaction in general, health, education (feedback), and self-assessment of material well-being are interrelated, but the connections are different in strength.

The first three components were included in the first factor of the latent factor structure. The first factor clearly includes only self-assessment of health out of HC resources. The resources of social capital were integrated into the second factor.

Work motivation is attributed to the third factor, while achievement motivation is significantly more pronounced for young respondents. The third factor is weakly related to tactical optimism (regarding the near future), self-assessment of health. The fact that healthy and young people are more optimistic is a fairly trivial result, which rather works to confirm the validity of our tools. A meaningful conclusion is that social capital indicators, such as generalized trust, trust in institutions and a sense of protection, are loosely associated with social optimism and material well-being, which confirms the actual separation of these groups of variables into various factors. The practical conclusion is that the combination of the considered components into a single index of human capital is not empirically justified. In addition, it is shown that social capital in the considered society does not work as a social result at the meso-level.

The main hypothesis of the work was partially confirmed. In prosperous periods, social well-being, social and human capital types in the region grow, but there are certain restrictions that do not allow us to talk about the general nature of such an increase. According to general estimates obtained on the example of the society of the Tyumen Oblast, 40–50% of the population is involved in the processes of social and human capital accumulation. Partial confirmation of the second-level hypothesis demonstrates that high levels of HC resources correspond to an increased sense of social well-being, protection, and trust in institutions. however, the latter does not apply to generalized trust.

The limitations are the weak coherence of the dynamics of the HC resources, the level of security and social optimism, which also causes partial confirmation of the second-level hypothesis. The considered interdependencies are not unidirectional, they indicate significant distortions in the public consciousness and the processes of supporting the accumulation of human capital. The main contradiction observed is the lack of connection between the components of achievable work motivation and other human capital resources, such as material well-being and professional status at work, measured in terms of the number of subordinates. Achievement motivation, which according to theoretical concepts is a necessary condition for the development of human capital, is currently poorly related to the status of the respondent and generalized trust. One of the important problems of Russia is that the need to develop an achievable work motivation is not confirmed in real practices. The accumulation of social capital is strongly associated with the citizens' feeling of protection from the main problems and dangers and weakly (but statistically stable and reliably positive) with social and material well-being.

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INSERTS

Insert 1. Sample structure

The results of socio-cultural monitoring (2006–2019) in the Tyumen Oblast are used. Quota samples are representative by territory and gender and age structure, with random selection within groups with control by the level of education of the respondent. In 2009: 33% rural population, 67% urban population; 47% male, 53% female.

Volume of data samples, pers.

Year	2006	2009	2011	2013	2016	2017	2018	2019
Number of people	1715	1560	1271	2335	1422	1640	1610	1642

Insert 2. Indices structure

(1) **Self-assessment of material well-being**: *Which of the following statements best describes your and your family's financial situation today?* See ins. 3, tab. 1.

A. Components of social well-being

(2) Life satisfaction: *How satisfied do you feel with your life in general?* Encoding: 1 Fully satisfied. 0.75. Rather satisfied. 0.5 I can't say for sure. 0.25 I am not very satisfied. 0 I am not satisfied at all. The Life satisfaction Index (LsI) is considered as a weighted average score.

(3) Social optimism is calculated as the average of three components: confidence in the future or strategic optimism (3.1), assessment of the current period (3.2) and tactical optimism (3.3).

(3.1) Strategic optimism, StrI: *How confident or not confident are you today in your future?* Encoding: 1 Quite confident. 0.75 More confident than not. 0.5 Can't say for sure. 0.25 Rather not confident than confident. 0 Not confident at all.

(3.2) Assessment of the current period, AcpI: *Are you and your family living better than last year or worse?* Encoding: 1 We started living much better than before. 2 We started living somewhat better. 3 Nothing has changed. 4 We started living somewhat worse. 0 We started living much worse.

(3.3) Tactical optimism, ToI: *Do you think that in the coming year you and your family will live better than today, or worse?* Encoding: 1 We will live much better. 0.75 We will live somewhat better. 0.5 Nothing will change. 0.25 We will live a little worse. 0 We will live much worse.

(4) Protection from major problems and dangers: *How much do you personally feel protected from various dangers today?* (11 categories). Encoding: 1 I feel protected. 0.75 I think I am rather protected. 0.5 It is hard to say. 0.75 I am rather not protected. 0 I am not protected at all. Protection index (PI) was calculated as an average of 11 components.

B. Social capital components

(5) 5.1. Generalized trust (TI): *Do you believe that most people can be trusted, or do you tend to believe that even excessive caution will not hurt?* Answers on the Likert scale, 11-member: 0 - even excessive caution does not hurt; 1 – most people can be trusted.

5.2. Trust in social institutions: *Tell me, please, to what extent do you trust or do not trust* (the list included 15 items)? Encoding - five-term Likert scale: 1 – I trust completely; 0 – I don't trust at all. The index (TI) was calculated as the arithmetic mean of 16 institutes.

C. Human capital components (education, health, work motivation)

(6) Level of education: 1 – postgraduate, academic degree; 0.75 – higher (bachelor, specialist, master); 0.5 – specialized secondary (professional); 0.25 – general secondary (11 classes); 0 – incomplete secondary (8-9 classes).

(7) *How do you assess the state of your health?* 1 – normal health, have no complaints; 0.75 – sometimes ill; 0.5 – often ill; 0.25 – have a chronic disease; 0 – disabled.

(8) *Do you have subordinates in your main job*? Encoding – five-term Likert scale: 1 – more than 100 people, 0 – no, I do not have.

(9) 9.1. *What job would you prefer today if you could choose?* 1 – having own business, running it at own risk; 0.5 – earning a lot, even without special guarantees for the future; 0 – having a small but solid income and confidence in the future.

9.2. If you have the opportunity to change jobs, which of the following would you prefer? 1 – starting own business; 0.75 – becoming a middle or upper-level manager; 0.5 – getting promotion with more responsibility; 0.25 – staying in the same position; 0 – not working at all.

10. Age of the respondent.

Insert 3. Tables for interpreting the results

Table 1. Self-assessments of material well-being, 2019, Tyumen Oblast, % of the number of respondents (excluding those who evaded the answer)

	Distribution	Conventional notification
Money is not enough for everyday expenses	7	"Extremely poor"
The entire salary is spent on everyday expenses	14	"Poor"
Money is enough for everyday expenses, but buying clothes is difficult	20	"Disadvantaged"
Money id basically enough, but I need to borrow to buy expensive items	32	"Provided"
Money is enough almost for everything, but it is difficult to purchase an apartment or a cottage	19	"Well-off"
We do not deny ourselves anything	7	"Rich"
No answer	1	
Total	100	Total
Source: own calculation based on the data of socio-cultural monitoring in the Tyumen Oblast (see insert 1).		

Table 2. The measure of adequacy and Bartlett's test

Kaiser-Meyer-Olkin measure of selective adequacy	.883
Bartlett's test of sphericity, Chi-square	1355.302
Ст. св.	91
Significance (p)	.000

Table 3. Correlations (according to Spearman) between the components of social well-being, social and human types of capital

		1	2	3.1	3.2	3.3	4	5.1	5.2	6	7	8	9.1	9.2
1	Material well-being	1												
2	Lsl	.339	1											
3.1	Strl	.376	**.649**	1										
3.2	Acpl	.353	.361	**.417**	1									
3.3	Tol	.291	**0,401**	**.476**	**.516**	1								
4	Pl	.249	.312	.389	.235	.245	1							
5.1	Generalized trust		.15	.176				1						
5.2	Trust in institutions	.201	.29	.348	.154	.186	**.503**	.24	1					
6	Education	.163								1				
7	Health assessment	.178	.267	.252	.209	.334	.165		.105		1			
8	Do you have subordinates in your main job	.181	.148	.144								1		
9.1	What kind of work would you prefer	.,156				0,11		-.155					1	
9.2	If you have an opportunity to change job, what would you choose			.101	.153	.202		-.125			.138		.388	1
10	Age		-.11		-.174	-.207		.101			-.227	.132	-.252	-.388

The matrix is reduced to a diagonal form, insignificant correlations below 0.1 modulo are suppressed.
Source: own calculation based on the data of socio-cultural monitoring in the Tyumen Oblast.

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Received May 08, 2020.

DOI: 10.15838/esc.2020.6.72.15
UDC 378, LBC 74.48

Beyond Teaching and Research: Stakeholder Perspectives on the Evolving Roles of Higher Education

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Abstract. Many scholars have observed that the traditional teaching and research functions ascribed to higher education have now expanded to involve a wider range of objectives and actors in response to changing internal and external demands. However, the available literature on the topic lacks accounts reflecting stakeholder perspectives. This paper aims to respond to this limitation by implementing a content analysis of 12 semi-structured interviews with European and international experts in the field of higher education. More specifically, it sketches their views on higher education institutions' roles considering current and emerging imperatives and the tensions and contradictions arising from the evolution of their conventional functions. The results show that higher education institutions are perceived to serve a combination of multiple roles: as enablers of skills and attributes, co-creators and users of knowledge, intermediaries between social actors, instigators of social change, and active agents of

For citation: Caro-González A., Anabo I.F. Beyond teaching and research: stakeholder perspectives on the evolving roles of higher education. *Economic and Social Changes: Facts, Trends, Forecast,* 2020, vol. 13, no. 6, pp. 252–266. DOI: 10.15838/esc.2020.6.72.15

their own transformation. This finding aligns with literature in terms of the diverse and relational nature of modern higher education institutions' operations. While desirable, their fulfilment generates several tensions and contradictions: such as responding to global vs. regional trends, adopting flexibility vs. standardization, pursuing excellence and competitiveness vs. inclusion, competing logics, and managing institutional inertia. The study can benefit educational managers and researchers by offering new insights into generating networked action and building ecosystems as higher education reconfigures its roles to navigate the changing social and economic landscape.

Key words: third mission, higher education institutions, ecosystem, engagement.

Introduction

The realm of higher education has undergone remarkable shifts over the last decades in response to its changing socio-economic context. Higher education institutions (hereinafter – HEIs) now face the imperative to not just engage in cross-border collaborations but also compete for resources and gain positional advantage as fuelled by the all-encompassing force of globalization [1]. The fast-paced evolution of advanced technologies has also prompted universities to adopt pedagogical and curricular adjustments to respond to new labour market demands. As work sectors, markets, and business opportunities were expanded by digital technologies, so did the skill sets and profiles demanded from the workforce[1]. Digital technologies have also triggered the unprecedented growth in data and computational capacity, requiring educational institutions to develop more complex and sophisticated processes of knowledge generation and management. Additionally, the discourse of social mobility has gained traction in recent decades, challenging HEIs to respond to social justice issues of access and equity [2].

European policy is well attuned to these trends. At the turn of the 21st century, there was a strong push for HEIs to undergo significant reforms in preparation for an international and knowledge-driven economy founded on information processing, knowledge production, and specialized services. Europe was adamant about developing a consolidated strategy to ensure that it could not only adapt but also to compete in the global market. Since the launch of the Lisbon Agenda in 2000, policy makers have sought to highlight the plural roles of higher education and the need to leverage its contributions to the economic and social growth[2].

These policy reconfigurations run parallel with academic scholars' observations on the evolving and expanding roles of HEI's in addition to teaching and research. Teaching is arguably the most prominent and longest running function of higher education, whereby universities served as training sites for the elite and skilled professionals [2]. Around the 19th century, research became a key feature of university activity as Professor Wilhelm Humboldt instigated important reforms at the University of Berlin [3]. More recently, an added dimension – often referred to as the "third stream" or "third mission" (hereinafter – TM) – has surfaced, prompting HEIs to provide societal value and engage with a wider pool of actors [4–6].

[1] World Economic Forum. *The Future of Jobs Report*, 2018.

[2] European Commission. *Communication from the Commission: The role of the universities in the Europe of Knowledge*. COM, 2003. 58 final.

According to Laredo [7], the onset of the TM took place in the mid-1970s, and it was driven by commercial demands. Until then, knowledge generation in universities was essentially confined to fundamental research. As scholars began to develop new insights into the tacit element of knowledge and the importance of non-firm knowledge on firms' innovation processes, the case became stronger for industry and academia to establish closer relationships. He also added that this shift was a result of the reconceptualization of innovation as a product of networked collaborations and, hence, the value added of other stakeholders, such as academic researchers.

The economic-driven origins of higher education's TM continue to reverberate in contemporary interpretations of HEI's functions. Furthermore, its economic benefits are framed within a broader imperative of contributing to national and regional development and boosting the financial capacities of universities through a model of an "entrepreneurial university". According to Chatterton & Goddard [8], this phenomenon is driven by globalization, the increased value of non-material assets, such as knowledge, and the overarching view of regions as sites of political and economic importance. The entrepreneurial university "envisions an academic structure and function that is revised through the economic development alignment with research and teaching as academic missions" [9, p. 314]. This development further led to the emergence of the triple helix model with universities contributing to the knowledge-based society through human capital formation and the creation of new business ventures [9]. Technology licensing, university spin-offs and start-ups, science parks, incubators, business angels, and venture capital are just a few examples of activities that have materialized after this shift [10].

While having gained momentum in recent decades, several scholars contend that the HEI's TM goes beyond commercialization to involve a broader notion of engagement with non-academic actors [11]. Especially with sustainability challenges and planetary threats becoming more salient, universities' non-profit orientation and long-term thinking capacities are particularly valuable contributions [12]. This call to action is both global and regional, whereby universities' collaboration forms part of a number of social actions in the domains of strategic planning, sustainable development, city regeneration, and widening access to higher education [13]. Several authors also contend that universities engage externally not only for commercialization – as the previous notions of the TM and "entrepreneurial university" suggested – but also for a number of non-financially-driven rationales [8] [14]. As a result, a new vocabulary capturing the wider stream of higher education activities emerged, including terms such as the "engaged" and "sustainable" university [15]. Other models, such as the "relational" university [16] and universities as co-creators and transformers [12; 17] have likewise alluded to the expanded missions of the HEIs. In line with this, a largely commercial focus of the triple helix model of innovation has been expanded to incorporate social, democratic, and ecological dimensions as reflected in the development of the quadruple [18] and quintuple helix innovation models [19].

The evolving nature of HEI's plural roles[3] has received considerable interest from academic researchers. Indeed, there have been notable efforts to map the scope of studies on the topic through systematic literature reviews [4; 14; 15; 20; 21], historical analysis [7; 22],

[3] Roles are used in this publication interchangeably with missions and functions.

and case studies [10; 23]. The extent and depth of this body of work offer valuable insights to define the scope of HEI's roles, more deeply understand the imperative for change, and provide critical perspectives in the assumption of its varied missions. However, to date, there is a lack of interpretive studies reflecting stakeholder perspectives on the nature of HEI's roles and their implications [24; 25]. This article aims to fill this gap by presenting European and international stakeholder perspectives on the roles ascribed to HEIs, the range of actors involved, and the tensions that may arise in the evolution of their conventional functions. It does not aim at mapping the full scope of universities' responsibility: rather, it seeks to tap into expert knowledge to illuminate the broad themes that characterize contemporary interpretations of HEI's most salient roles and outline the resulting tensions and contradictions.

This analysis is a part of a broader project on the implications of the European Pillar Social Rights4 on education policy and practice. It draws on qualitative data from 12 in-depth semi-structured interviews with leading European and international experts in the field of education and training. Experts have become an increasingly important source of data since the 1990s, reflecting a move toward hybrid forms of knowledge generation [26]. While there is no consensus on what constitutes an expert, we draw on a broad definition offered by Bogner & Menz, who view an expert as a person who possesses "technical, process, and interpretative knowledge that refers to a specific field of action" [27, p. 54]. The scientific interest in this type of data is not the least based on the perceived authority of their knowledge but rather on "the social relevance of experts in modern life and their ability to affect people's practices to a significant degree" [28, p. 655]. More specifically, we are concerned with experts' interpretative knowledge, which "comprises not only (subjective) perceptions and descriptions of reality but also normative dispositions" [28, p. 658]. We find that this mode of data collection is particularly aligned with the paper's object of inquiry – HEI's changing roles – which itself is a product of meaning making and negotiated interpretations. By tapping on their explicit and implicit knowledge in the field, we are able draw insights that can inform policy and practical decisions toward enhancing the contributions of higher education to internal and external demands.

The article is structured as follows. First, it presents the broad themes reflecting the aggregate views of leading stakeholders in the field regarding HEI's contemporary roles. This is followed by a discussion of their interdependencies with non-academic actors. Lastly, several tensions and contradictions resulting from these reconfigurations are presented, as well as possible mitigating actions.

Material and methods

Semi-structured interviews among stakeholders were conducted between April 2018 and July 2019 using non-probability sampling. In this process, the 12 experts were identified based on accessibility (convenience sampling) and their related sectoral and geographical expertise (purposive sampling) [29]. Local stakeholders involved in this study are located in the Basque Country, a region classified in the European Regional Innovation Scoreboard as having moderate levels of innovation and demonstrating the largest percentage (8.8%)

[4] EPSR's first principle explicitly draws the relationship between quality and inclusive education, training, and lifelong learning for skills development geared towards full societal participation and successful management of transitions in the labour market.

Table 1. An overview of participants' sectoral and geographical profiles

Expert ID*	Gender	Age	Role	Sectoral affiliation	Geographical representation
EXP1	Male	+60	Independent Expert; Ex-Officer and Head of Unit of the European Commission	Governance	European (Netherlands, Belgium)
EXP2	Male	50-60	Head of Unit and Policymaker in European Commission	Governance	European (Portugal, Belgium)
EXP3	Female	30-40	University Researcher; Expert in Interactive and Inclusive Learning (Ikerbasque Fellow)	Academe	International (Spain)
EXP4	Male	+40	Policymaker in United Nations; Expert with proven track record in Lifelong Learning and Vocational Training policies	Governance	International (Mexico, France, Chile)
EXP5	Male	+40	Policymaker and Local Government Officer in the Basque Country; Senior Expert in Economic Development, Trade and Employment	Governance	Local; Regional (Basque Country)
EXP6	Female	30-40	Director of Innovation, Non-Government Organisation	Civil society	Local; Regional (Portugal)
EXP7	Female	40-50	University Faculty Member; Expert in Biosciences Engineering	Academe	Local; Regional (Belgium)
EXP8	Male	50-60	University Professor and Expert in Labour Market Studies, Industrial Relations and Resilient Societies; Expert with proven track record in Regional Economy, Citizenship, Democracy and Digitalization	Academe; Governance	European; Regional (Netherlands)
EXP9	Female	30-40	University Faculty Member; Expert in Digital Technologies and Remote Learning	Academe	European (Spain, Swiitzerland, Estonia)
EXP10	Female	+65	Civil servant and Senior expert of Science, Technology and Innovation Policy, University Professor, OECD	Academe; Governance	International (Japan)
EXP11	Male	50-60	Director, Social Enterprise; Expert with a proven track record in innovative employability solutions for people at risk of exclusion	Industry	Local; Regional; National (Basque Country, Spain)
EXP12	Male	50-60	Policymaker and Deputy Minister, Basque Government	Governance	Local; Regional (Basque Country)

* Expert IDs are used when referring to the experts in the analysis.

of innovation change through time in Spain[5]. It is also where the authors primarily conduct their research work. Meanwhile, international stakeholders represent pan-European and other country perspectives. The experts were asked to sign an informed consent prior to participation.

Each interview lasted between one to one and a half hours. The interviews were carried out either in English or Spanish, transcribed in their original language, and analyzed using an iterative process of conventional content analysis [30]. The first round of the analysis was carried out separately by the authors through a preliminary immersion with the first three transcripts. Open coding [31] was used and excerpts that suggest a driver of change, an actor, and an explicit or implicit role associated with it were tagged. Versus coding [31] was also done to code the tensions. Memos were made along the way to record salient concepts and analysis notes.

[5] *European Commission. Regional Innovation Scoreboard.* Directorate General for Internal Market, Industry, Entrepreneurship and SMEs, 2019. Available at: https://ec.europa.eu/docsroom/documents/36064 (accessed: October 1, 2019).

The preliminary set of codes was then shared and collaboratively refined by the authors followed by a second round of coding. This step involved an attempt to limit the codes to the preliminary list and adding new codes if necessary [30]. The coded excerpts from this process were then extracted, the appropriateness of the codes was reviewed, and related or redundant codes were merged. The last round involved finalizing categories and subcategories and drawing the interrelationships between roles, agents, and possible tensions.

Results and Discussion

Following the analysis, it was determined that expert interpretations of HEIs' roles aligned with the missions identified by academic literature: teaching, research, social engagement, and societal development. The findings also confirm the networked and multi-stakeholder dynamics needed for the fulfilment of these roles – with governments, businesses, and civil society, including individuals, being identified as key collaborators. Interestingly, another relevant yet distinct role has emerged: HEIs being agents of their own transformation. The following subsections will provide a more detailed discussion of these dimensions, culminating in the tensions and contradictions that emerged in the reconfiguration of HEIs' conventional functions.

Higher education institutions' redefined roles

Experts' interpretations of HEIs' roles involve elements of their traditional functions. Teaching was primarily depicted as the development of skills and attributes for students' democratic and work lives. Meanwhile, their research mission is understood as the knowledge use and co-creation with other actors. The commercialization dimension of the TM was not as prominent in the data analysed, which may be explained by the predominance of social actors among the expert pool and the social framework of the broader research project focusing on EPSR's implications. HEIs' responsibility for social engagement involves teaching, research, and management dimensions toward collaborative curriculum and pedagogies, knowledge generation, and social transformation. Lastly, the role of acting as its own agent of transformation surfaced as a relevant yet distinct role from the ones identified in other studies, providing an interesting insight into the continuously evolving scope of HEIs' functions.

HEIs as enablers of skills and attributes

Experts viewed HEIs' teaching function as the key in preparing students for the digital demands to become even more salient in response to the digital economy and the salience of transitions as a facet of modern life. Experts identified the importance of developing students' specialised skill sets (especially for highly technical roles) on the one hand and more transversal skills on the other, including science, technology, engineering, arts, and mathematics (STEAM) (EXP1, EXP9, EXP12), digital skills (EXP1, EXP5, EXP8), oracy, communication, and negotiation skills (EXP3, EXP7), critical and creative thinking (EXP2, EXP3, EXP4, EXP5, EXP9, EXP12), complex reasoning (EXP3), emotional intelligence (EXP12), resilience (EXP5, EXP8), adaptability and flexibility (EXP5, EXP12), and entrepreneurship (EXP8). These transversal skills will allow students to navigate the digital world not just in professional contexts but also to adequately participate in the social and political domains (EXP2). These are in line with the broad remit accorded to HEIs for human capital formation and social cohesion[6].

[6] *European Commission Working Document: Analytical Underpinning for a New Skills Agenda for Europe.* SWD, 2016. 195 Final, Part 1/4.

Meanwhile, several experts like EXP5, EXP11, and EXP12 employ the term "values" as a central element of HEI's teaching activities. Social responsibility (EXP5, EXP11), critical and autonomous thinking (EXP5), and ethical decision-making (EXP12) were identified as key attributes for the future workforce – both for employees and employers. To achieve these aims, educators must update their pedagogical practices toward active methodologies such as problem-based learning (EXP12) and experiential and work-based learning arrangements like dual training programmes (EXP4, EXP11). Several studies corroborate the importance and benefit of such learning arrangements, especially regarding students' development of transversal skills needed for the entrepreneurship [32; 33]. Experts also envision a curriculum that incorporates social and community projects (EXP3, EXP4), efforts that have been found to boost motivation by offering practical experience and valuable skills [33] as well as higher student satisfaction with the opportunities they present for expanding their professional contacts [34].

Another salient theme in this regard is HEIs' role in raising students' awareness of the reality of transitions. As EXP2, EXP6, EXP9, and EXP10 pointed out, recalibrating students' employment expectations to match the certainty of change is paramount. EXP6 notes: "In terms of education and preparation, the biggest thing we can do is to make it clear that the whole concept of a job has changed a lot in the last few years, and it needs to change even more. People are still preparing for having a stable full-time job for the rest of their lives. They expect some pattern, or a routine, and I think this is probably what we need to deconstruct in the future because this won't happen".

This finding runs parallel with Tomlinson's [35] contention on the role of HEI's in the expectation management and raising students' awareness on the non-linearity of contemporary work trajectories.

Co-creators and users of knowledge

In addition to the evolving nature and focus of HEI's teaching function, as described above, two experts specifically alluded to the reinforced role of universities in generating societal impact through knowledge creation and application (EXP3, EXP7). For EXP3, part of this process involves moving away from the conventional notion of academia as the sole source of authoritative knowledge. Instead, she points to the emerging imperative for HEIs to make science available and accessible to everyone by breaking the hierarchy between the researcher and the "researched". This is viewed as an important dimension of tackling inequalities in the field of education participation and knowledge creation. EXP3 highlighted the need for university staff to reflect on and recognize higher education's privileged position in generating knowledge and making a shift toward a stance of co-creation and epistemological equality for the social good: "It is about making research available not only to teachers, but also to families, involving all the agents around a dialogue of what positive effects we have observed in those schools and in those communities that are already involved in making open access to science a right. It is a lever of change - an engine that enables people's first-hand access to research results, their involvement in new research processes, and their participation in knowledge generation in a way that is impactful and beneficial to their own communities".

The co-creating function being increasingly ascribed to and embodied by HEIs reflects what Trencher et al. [12] view as a synergistic

combination of the economic and social paradigms of the universities' TM. This approach, which Aranguren et al. [17] refer to as the co-transformative university model, leverages open innovation and competitiveness to contribute to inclusion and sustainability.

Intermediaries between social actors

The experts' consensus also lay on HEIs' function as intermediaries between social actors happening at the interregional and international levels (EXP1, EXP8), between educational systems of compulsory, post-compulsory, and higher education (EXP4, EXP12), between academic disciplines through interdisciplinary dialogue (EXP7), and across social domains through intersectoral engagement with governments, businesses, families, communities, and teaching staff (EXP3, EXP4, EXP9, EXP10). HEI's engagement with the wider community reflects teaching and research elements and manifests in a number of ways: as curricular activities involving hands-on and practical experience in the community and the workplace (EXP4, EXP10); as a venue for collective thought and the establishment of common objectives (EXP3, EXP11); and the establishment of linkages and alliances especially with businesses (EXP9). These connections may require regulated arrangements – such as the case of dual training programmes, service learning embedded in the curriculum, and official memberships in networks – or through ad-hoc and informal approaches such as engaging in dialogue and discussions with other actors. In practice, formal and informal activities characterize university engagement [21] and that a combination of them has been shown to maximize knowledge valorisation in specific fields, such as robotics and pharmacy [36].

Establishing linkages with the private sector is also perceived by EXP9 to provide direct contributions to students' individual work outcomes by expanding students' social capital and job choices, increasing companies' awareness of the value and relevance of education and training programs, and allowing for the co-definition of skills demand. Additionally, keeping communication lines open can allow HEIs to detect new sectors and adjust in their educational offerings (EXP12). Overall, academic-business partnerships have been shown to boost positive outcomes not just for students [37] but also for companies [38].

Instigators of social change

For many experts, HEIs' research, teaching, and engagement activities are now expected to serve social ends and promote inclusion (EXP1, EXP2, EXP3, EXP5, EXP7, EXP8, EXP9, EXP10, EXP11). This runs parallel with the more recent models of higher education delivery that incorporate social dimensions to HEIs' traditional missions [12; 16; 17]. EXP3 and EXP10 contend that adopting more social and participatory approaches to the research process not only enhances academia's awareness of actual societal issues but also boosts individual action and empowerment. With regard to teaching, education managers and staff are encouraged to invest more heavily in strengthening the service-oriented functions to develop a broad range of skills and values (EXP7), generate more awareness and responsive capacities in preparation for the work they will do upon study completion (EXP7), promote lifelong learning and permeability between vocational and university systems through the recognition of prior learning (RPL) (EXP1, EXP4), enhance students' capacities to provide innovative solutions to social problems (EXP4), and strive to produce transformative and socially responsible leaders (EXP3). Aside from the value contribution of higher education to society, EXP3 also identifies the reciprocal

benefit of engaging in such initiatives, boosting institutional prestige, and contributing to their own organizational learning by incorporating community and citizen knowledge.

Other experts highlight the importance of leveraging technology in fulfilling HEIs' role as instigators of social change. Cross-border online learning, while already in place, can be further developed and promoted to reach those with geographical, mobility, or time constraints (EXP5). The use of advanced technologies, such as learning analytics and artificial intelligence, can also enable the creation of individualized training solutions and allow students to envision a unique learning and career path which can be later adapted based on their changing needs and circumstances (EXP2, EXP9).

Active agents of organizational transformation

The evolving mission of HEIs, as described in the literature, alludes to an increasingly outward orientation that seeks to enhance and transform the environment where it operates. However, the analysis of expert interviews undertaken in this study points to the growing imperative for universities to look inward and develop a meta-capacity for agile organizational change. As EXP10 and EXP12 point out, the rapidly evolving context has been made incompatible with the stable and enduring nature of HEIs' operations. In essence, the teaching, research, and engagement roles previously described are encapsulated in the broader imperative for universities to become attuned to changes and be able to make timely changes whenever necessary. Specific adjustments include the use of technology-enabled platforms to boost engagement with other actors (EXP5), the creation of flexible and personalised educational paths through learning analytics and artificial intelligence (EXP2, EXP4, EXP6, EXP9, EXP12) and the provision of alternative educational offerings such as nanodegrees and module-type curricula (EXP5). Concomitantly, this would require the development of flexible yet comparable structures of validation and recognition of qualifications (EXP2, EXP4), as well as credential recognition tools like blockchains (EXP8). More broadly, HEIs are called to adopt a dispositional shift toward a more open (EXP10), systems-based, and socially-oriented approach to educational management (EXP5).

HEIs' interdependencies with other actors

The discussion in the previous section illustrates the networked nature of HEIs' roles. The experts' views converge in that a range of non-academic actors all contribute to the fulfilment of higher education's missions in conjunction with stakeholders working within education. Based on the interviews, three main non-academic actor groups were identified: governments, business, and civil society including individuals.

Governments

For EXP4, EXP6, and EXP8, HEI's social and economic contributions go alongside the role of governments as the equalizer of opportunities and protector of rights. By monitoring disadvantaged groups' specific needs in relation to education and training, social

Table 2. An overview of expert views on ET's redefined roles

	1	2	3	4	5	6	7	8	9	10	11	12
enablers of skills and attributes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
intermediaries between social actors	✓		✓	✓			✓	✓	✓	✓		✓
instigators of social change	✓	✓	✓		✓		✓	✓	✓	✓	✓	
co-creators and users of knowledge			✓				✓					
active agents of organizational transformation		✓		✓	✓	✓			✓	✓		✓

welfare, and work, they create a reinforcing dynamic that boosts HEI's role as an instigator of social change and inclusion. Efforts such as mobilizing funds for individualized training accounts to encourage and incentivize people to up-or re-skill (EXP2, EXP8), stipulating lifelong learning as a standard feature of work contracts (EXP8), and addressing teaching staff's competence, commitment, and job satisfaction (EXP12) are some of the relevant measures that the public sector can adopt in the supply side. Additionally, governments are also expected to address imbalances in the demand-side by driving job creation (EXP6), promoting social entrepreneurship (EXP8), developing data intelligence for job matching (EXP8), and regulating markets in order to ensure fair competition, work quality, and the sustainability of products and services (EXP1), especially in the age of exponential growth in the sharing and gig economy (EXP5). In relation to this role, EXP8 and EXP12 contend that public leaders should act as visionaries of sustainable human development and strive for cross-border collaborations and policies that encourage the move toward green and social economies.

Vertical and horizontal policy alignment and harmonization is another aspect that several experts identified to be an important area of action for the public sector. For EXP4, aligning policies vertically and horizontally is of paramount importance to ensure that instruments for permeable pathways, individualized learning, and RPL may be achieved. This involves boosting transparency and qualifications recognition through a common framework at the European level (EXP2), harmonizing governmental competences between different departments at the national level (EXP4), and creating pathways between VET and higher education systems (EXP2, EXP4, EXP5, EXP12). Lastly, governments are viewed as intermediaries between social actors – just like educational institutions. For instance, they are expected to be attuned to emerging work sectors (EXP12), align HEI's efforts not just with supranational but also regional sectoral priorities (EXP4, EXP8), co-define skills needs in the labour market (EXP1, EXP10), and leverage technology to create networks for inter-institutional communication and information sharing among entities (EXP12).

The private sector

Alongside governments, businesses are also expected to contribute to positive social and economic outcomes. The experts have identified three lines of action through which this may be achieved. Firstly, the private sector is deemed as a driver of growth and social impact (EXP8). By creating jobs and designing business plans around the social economy, businesses can tackle societal issues while generating paid employment, which also reduces the strain on social security. Secondly, employers are seen as contributors to fairness and sustainability by observing hiring practices that give way to job access for qualified participants from traditionally underrepresented backgrounds (EXP11), contributing to workers' professional development as part of their work contract (EXP8), and aligning organizational missions with sustainable goals (EXP1). Additionally, businesses are also considered active participants in an ongoing dialogue with governments and HEIs regarding the detection of new sectors and demand for skills (EXP1, EXP12) and modifying training offers to reflect labour market needs (EXP12).

Civil society and individuals

For several experts, the community at large plays a key and complementary role in the current dynamic. EXP5 alludes to the importance of cities as agents, which allows

local and grassroots initiatives to flourish alongside more top-down policy and decision-making. EXP9 also points to the active involvement of families as knowledge seekers, educating themselves and their children regarding career options. Moreover, the individuals themselves are seen as important advocates of the self-growth by developing awareness of their evolving needs (EXP9), assuming responsibility for their learning (EXP1), and upholding the inclusion of lifelong learning opportunities as part of their employment contract (EXP8).

Reconciling tensions: toward generating complex and multi-stakeholder ecosystems

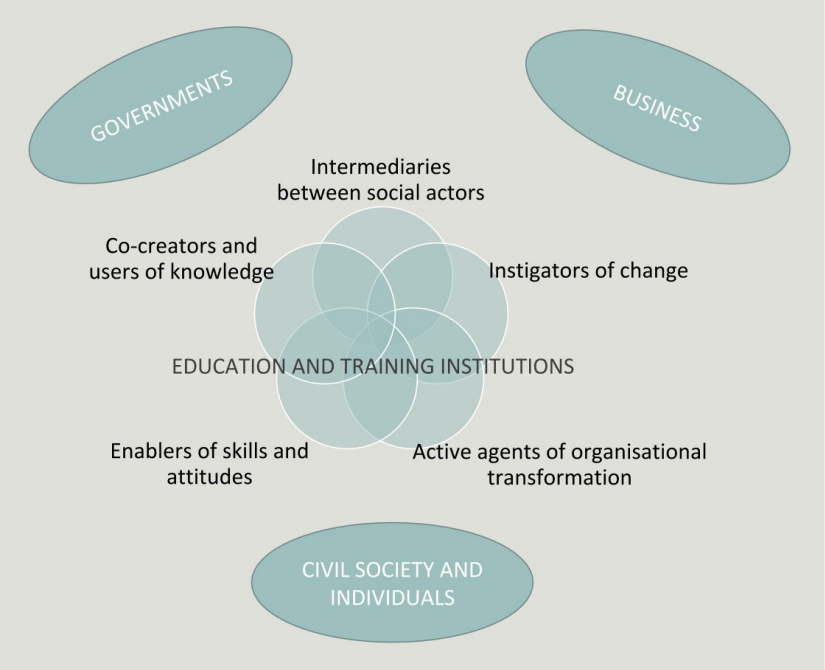
The interviewed experts identified several tensions and contradictions that may arise from the fulfilment of HEI's reconfigured roles. Firstly, there is an important tension between orienting HEIs toward global or regional needs. Many of the experts are of the view that, while there is a general pattern of growth in the ICT sector and among highly qualified jobs, labour markets continue to be shaped by regional and national (as sectoral specializations) rather than global contexts (EXP4, EXP8). It may also happen that HEIs' academic offerings fail to match employers' needs or become subject to country directives or regulations [20]. As such, there is an onus on universities to adopt a "glocal" outlook by being deliberate about staying abreast with global trends while being responsive to local realities. More specifically, this involves targeted funding, capacity building, training, and research initiatives reflecting a dual perspective.

Another theme that emerged in the interviews involves the binary between flexibility and standardization. While HEIs are called to be more open and flexible in teaching and curriculum design by creating individualized paths when mapping out learning programmes and career planning, the process of assessment and evaluation requires a contrasting approach. The specifics of skills and competences, the harmonization of qualifications and degree equivalency, and the standardization of learning assessments all present a fundamental conceptual conflict to the diversity and flexibility principles needed in modern educational arrangements (EXP4). Recognizing this tension is important, especially that it is likely to generate ethical and practical dilemmas to educators and educational managers.

Similarly, achieving the goal of inclusion in a context shaped by the excellence and competitiveness imperative poses challenges. Elitism is a particularly strong barrier (EXP1, EXP7) as is the pressure for HEIs to secure positional advantage. Additionally, educational access and participation remain problematic (EXP2) in a meritocratic context where academically underperforming students are at a disadvantage. Even among well-meaning institutions that show a willingness to become more inclusive, the lack of financial resources to support the additional manpower and capacities required for creating comprehensive inclusion programmes make the achievement of this goal particularly elusive. This is where governments can take a leading role as equalizers of opportunities (EXP4, EXP6, EXP8) by providing targeted funding for staffing needs, capacity building, and the development of technological tools to promote inclusion.

The long-standing competing logics between actors' spheres of action also present another fundamental challenge to HEI's fulfilment of its redefined roles. This manifests in the diverging ways with which knowledge is incentivised between these practice fields. For instance, enabling critical and creative thought for employment and citizenship is a desirable

Figure 1. A broad sketch of HEIs' ecosystem



academic outcome, yet some employers prefer obedience over innovation as a worker's attribute (EXP12). For EXP8, these tensions can only be addressed if stakeholders are able to establish common objectives to reduce trade-offs. Other experts further pointed to the importance of engaging in the intersectoral dialogue (EXP12) and creating opportunities for a joint awareness of how these modern skills can be leveraged in the workplace (EXP9). These views invoke a sense of reciprocity and collaboration – principles that are embodied in something which Karalash & Baumol [39] identify as an educational ecosystem. More specifically, it involves "an intersectional system of an educational community, its environment and stakeholders... as well as the interdependence and mutual requirements of the stakeholders" [39, p. 107]. In this sense, the reconfigured roles and relevant actors, discussed above, comprise HEIs' ecosystem depicted in figure 1 below.

Powell & Walsh [40] contend that an ecosystem approach is underpinned by a broader understanding of HEIs' societal impact beyond commercialization. It features dynamic collaborations characterized by "mutuality and shared goals" [40, p. 574], and it views stakeholders as partners. For such an arrangement to emerge, Weerts & Sandman [41] identified the central role of "boundary spanners" to support universities' engagement. These key individuals mediate and negotiate within and between different spheres, representing ideas and concerns from all sides to draw commonalities.

Lastly, several experts allude to the friction generated by institutional inertia amid rapid contextual change. Fear and attitudinal resistance, especially in the midst of proposals for fundamental shifts, lead to slower uptake (EXP5, EXP7). In the innovation literature, this phenomenon is referred to as the institutional dissonance, which can manifest itself internally

– as an actor's withdrawal or disinvestment as a result of the mismatch between individual beliefs and institutional action or ethos [42]. The ease with which change is accommodated was also viewed by EXP11 to be shaped by the cultural dimension, pointing out that more egalitarian systems are more likely to meet less resistance toward collaborative dynamics than hierarchical societies. With the changes required and the resistances that universities need to confront, there is the danger for HEIs to suffer from the "mission overload", thereby straining and overstretching HEIs' capacities [5; 43]. This reality poses important points for reflection among education managers as to how to mobilize their internal ecosystem toward establishing a shared vision and pursuing collaborative and win-win solutions.

Conclusion

Overall, the empirical evidence presented in this analysis aligns with the existing body of literature in the observation that HEIs are nowadays expected to cover a wider scope of roles beyond their conventional teaching and research functions. Additionally, the analysis illuminates the importance of harnessing universities' transformational capacity – a dimension that goes beyond how the TM is conceived. Replacing the ivory tower with collaborative dynamics, however, leads to several tensions. We have identified several possible measures to address them, including finding complementary roles with other stakeholders to offset drawbacks, identifying individual actors that can mediate and represent the interests of the parties involved, and the cultivation of mutually beneficial and collaborative relationships rooted in the achievement of shared goals through an ecosystem in collegial and collective ways. Indeed, higher education has a unique societal position that must be leveraged by enhancing their capacity for collaborative engagement and institutional transformation [44].

The insights that emerged from this discussion prompt several topics for the future research. For instance, the reliance on experts' views may be expanded to include a higher number of participants and a wider range of stakeholders. It would also be worthwhile to gather the views of non-European stakeholders and analyse how could they be compared to the interpretations presented in this study. In general, we hope that we shed some light on the normative aspects of HEIs' operations and prompted a thoughtful reflection on how to fulfil the various facets of higher education's remit in a truly impactful way.

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Received August 8, 2020.

Public Opinion Monitoring of the State of the Russian Society

As in the previous issues, we publish the results of the monitoring of public opinion concerning the state of the Russian society conducted by VolRC RAS in the Vologda Oblast[1].

The following tables show the dynamics of a number of parameters of social well-being and socio-political moods of the region's population based on the results of the last "wave" of monitoring (December 2020), as well as for the period from October 2019 to October 2020 (last 6 polls).

We compare the results of the surveys with the data for 2000 (the first year of V. Putin's first presidential term), 2007 (the last year of V. Putin's second presidential term, when the assessment of the President's work was the highest), 2011 (the last year of Dmitry Medvedev's presidency), and 2012 (the first year of V. Putin's third presidential term).

We also provide yearly dynamics of the data for 2018–2020.

In October – December 2020, the level of approval of the work of the President of the Russian Federation did not change significantly. The share of positive assessments is 52%, negative – 33%.

At the same time, population's assessments are somewhat lower than at the beginning of the year: from December 2019 to December 2020, the share of positive assessments decreased by 2 p.p. (from 54 to 52%), negative – increased by 2 p.p. (from 31 to 33%)[2].

In yearly dynamics, there is a continuing decrease of the level of approval of the President's work: in 2018, the share of positive assessments was 66%, in 2019 – 57%, in 2020 – 52% (from 2018 to 2020 in general – decrease by 14 p.p., from 66 to 52%).

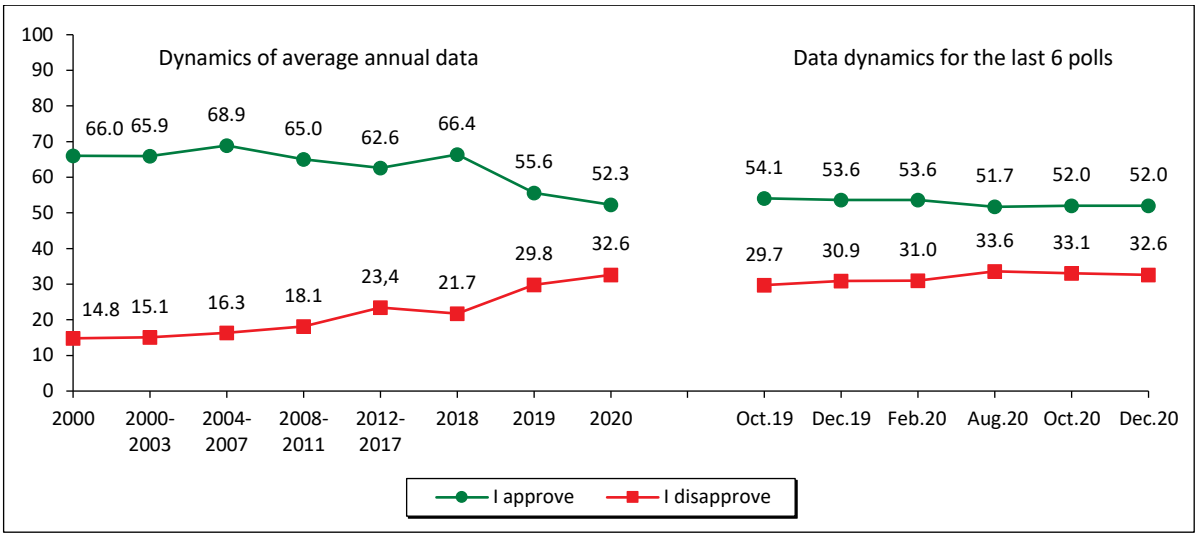
The relative share of negative assessments in 2018 was 22%, in 2019 – 30%, in 2020 – 33% (from 2018 to 2020 in general – growth by 11 p.p., from 22 to 33%).

[1] The polls are held six times a year in Vologda, Cherepovets, and in eight districts of the oblast (Babayevsky District, Velikoustyugsky District, Vozhegodsky District, Gryazovetsky District, Kirillovsky District, Nikolsky District, Tarnogsky District, and Sheksninsky District). The method of the survey is a questionnaire poll by place of residence of respondents. The volume of a sample population is 1,500 people 18 years of age and older. The sample is purposeful and quoted. The representativeness of the sample is ensured by the observance of the proportions between the urban and rural population, the proportions between the inhabitants of settlements of various types (rural communities, small and medium-sized cities), age and sex structure of the Oblast's adult population. Sampling error does not exceed 3%.

More information on the results of VolRC RAS polls is available at: http:// www.vscc.ac.ru/.

[2] Hereinafter, the results of a comparative analysis of survey data, conducted on December 2020, and the results of a last-year monitoring "wave" are given in the frame (December 2019).

In general, do you approve or disapprove of the work of the President of Russia?
(% of respondents, FSBIS VolRC RAS data)*



* Hereinafter, all graphs show average annual data for 2000, 2018, 2019, 2020, as well as average annual data for 2000–2003., 2004–2007, 2008–2011, 2012–2017, corresponding to the periods of presidential terms.

How do you assess the current performance of..? (% of respondents)*

Respond option	Dynamics of average annual data							Data dynamics for the last 6 polls						Dynamics (+/), Dec. 2020 to Dec. 2019
	2000	2007	2011	2012	2018	2019	2020	Oct. 2019	Dec. 2019	Feb. 2020	Aug. 2020	Oct. 2020	Dec. 2020	
RF President														
I approve	66.0	75.3	58.7	51.7	66.4	55.6	52.3	54.1	53.6	53.6	51.7	52.0	52.0	-2
I disapprove	14.8	11.5	25.5	32.6	21.7	29.8	32.6	29.7	30.9	31.0	33.6	33.1	32.6	+2
Chairman of the RF Government**														
I approve	-**	-**	59.3	49.6	48.0	41.1	38.7	41.1	41.1	37.9	38.9	38.8	39.1	-2
I disapprove	-	-	24.7	33.3	31.6	38.4	40.4	37.5	38.9	40.9	40.9	40.8	38.8	0
Governor of the Oblast														
I approve	56.1	55.8	45.7	41.9	38.4	35.7	35.0	35.6	35.6	36.2	35.2	35.5	32.9	-3
I disapprove	19.3	22.2	30.5	33.3	37.6	40.2	42.5	40.1	40.8	41.8	41.9	42.1	44.2	+3

* According to the methodology of the study, the sampling error does not exceed 3%. Hereinafter, changes with a 2 p.p. difference are not taken into account or considered insignificant; they are highlighted in blue in the tables. Positive changes are highlighted in green, negative changes are highlighted in red.
** The question was first asked in 2008. In 2020, the first poll was conducted in January 24–February 12. The current chairman of the RF Government M.V. Mishustin has just started his new work (January 16, 2020), therefore, respondents were asked about work of the former Prime Minister – Dmitry Medvedev.

For reference:

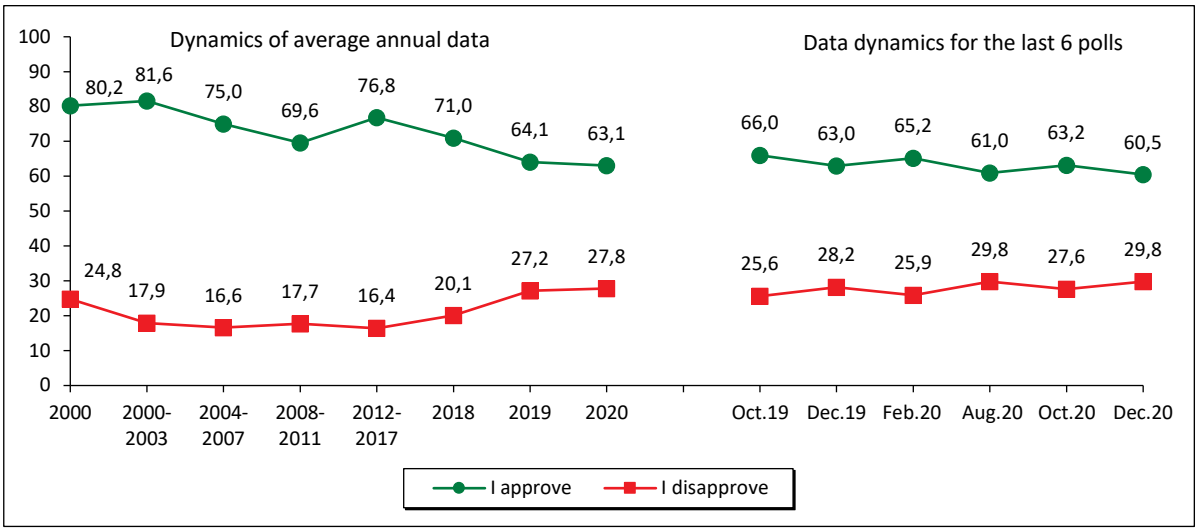
According to VCIOM, the level of approval of the President's work in October – December 2020 decreased insignificantly (by 2 p.p., from 63 to 61%), the share of negative assessments also decreased by 2 p.p. (from 28 to 30%).

There are no significant changes in 2020 in comparison with 2019 (the level of approval is 63–64%).

According to Levada-Center, the relative share of positive assessments of the President's work in October – November 2020 decreased by 3 p.p. (from 68 to 65%), negative – increased by 3 p.p. (from 31 to 34%)[3].

There is a 3 p.p. decrease of the approval of the President's work (from 67 to 64%) in average annual assessments for 2019–2020.

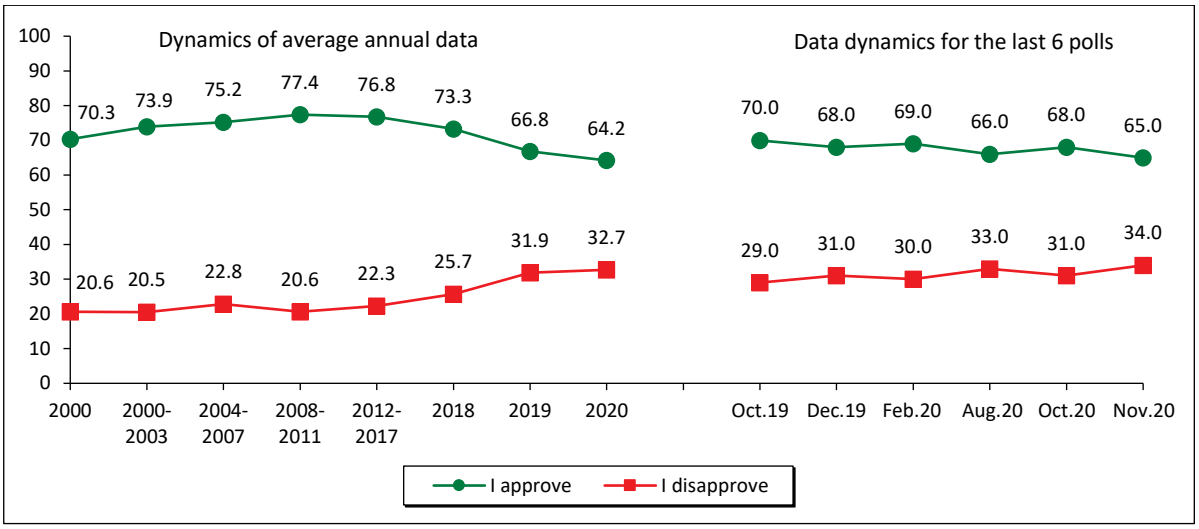
In general, do you approve or disapprove of the work of the President of the Russian Federation? (% of respondents; VCIOM data)



Source: VCIOM data. Available at: https://wciom.ru/

Data for December 2020 – average value for two polls: from December 6, 2020 and December 13, 2020.

In general, do you approve or disapprove of the work of V. Putin at the position of the President of Russia? (% of respondents; Levada-Center data)



Source: Levada-Center data. Available at: https://www.levada.ru/

[3] Different methodological approaches, applied by VCIOM, Levada-Center, and VolRC RAS, do not allow comparing the results with each other. Nevertheless, the collected information makes it possible to analyze the overall dynamics of social attitudes that exist in Russian society, which are recorded by three different research centers (two Russian and one regional).

From October to December 2020, there have been no significant changes in the assessment of the success with which the President solves the country's key problems:

Nevertheless, a gradual decrease of the share of positive assessments over 2020 is seen in most key problems. From December 2019 to December 2020:

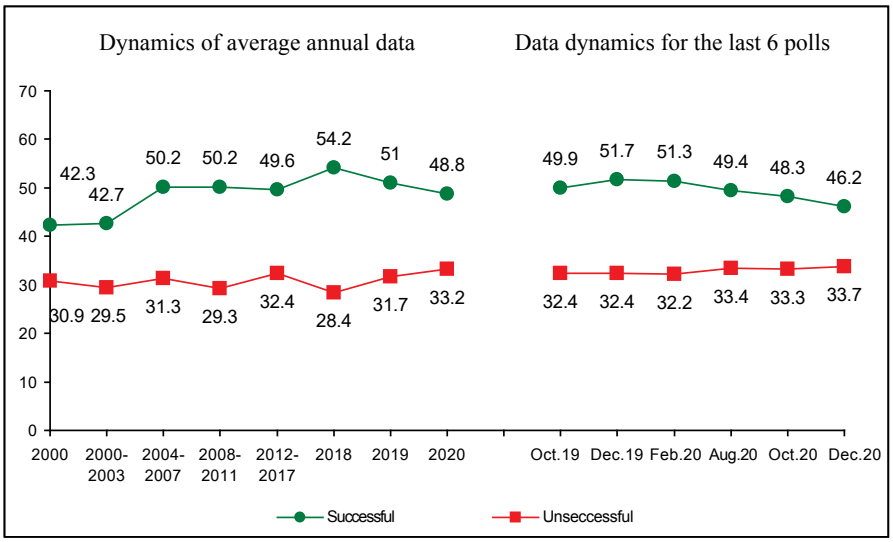
- ✓ there is a 6 p. p. (from 52 to 46%) decrease of the share of people who think that the President is successful in strengthening Russia's international positions;
- ✓ there is a 3 p. p. (from 44 to 41%) decrease of the relative share of those who positively assess the President's work in restoring order in the country;
- ✓ there is a 2 p. p. (from 34 to 32%) decrease of the share of people who support the President's work protecting democracy and strengthening the freedoms of citizens;
- ✓ the share of those who positively assess his efforts aimed at boosting the economy and increasing the welfare of the population has barely changed in December 2019 – December 2020 (25–26%); it remains rather insignificant, and the relative share of negative assessments has increased by 2 p. p. over the same period (from 60 to 62%).

There is a decrease of the share of positive assessment in the dynamics of average annual data from 2018 concerning the President's work on:

- ✓ strengthening Russia's international positions (by 5 p. p., from 54 to 49%);
- ✓ restoring order in the country (by 8 p. p., from 51 to 43%);
- ✓ protecting democracy and strengthening the freedoms of citizens (by 7 p. p., from 41 to 34%);
- ✓ boosting the economy and increasing the welfare of the population (by 6 p. p., from 31 to 25%).

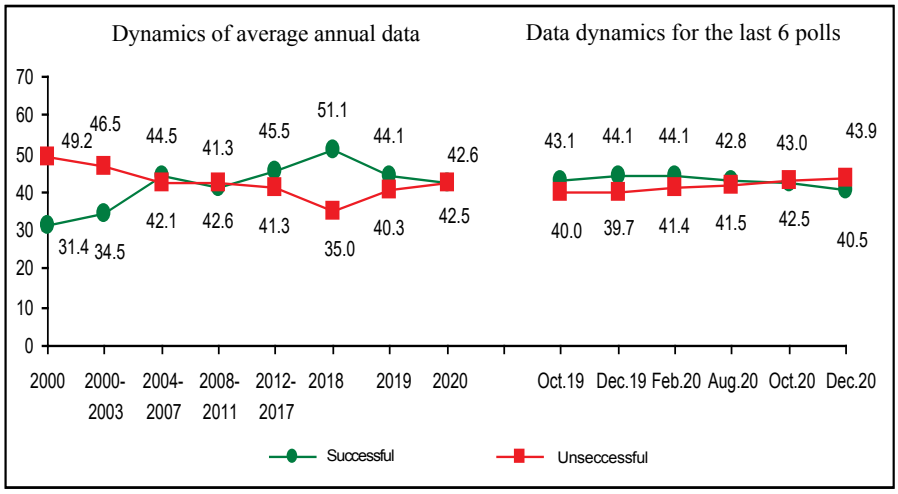
In your opinion, how successful is the RF President in coping with challenging issues..?
(% of respondents; FSBIS VolRC RAS data)

Strengthening Russia's international positions



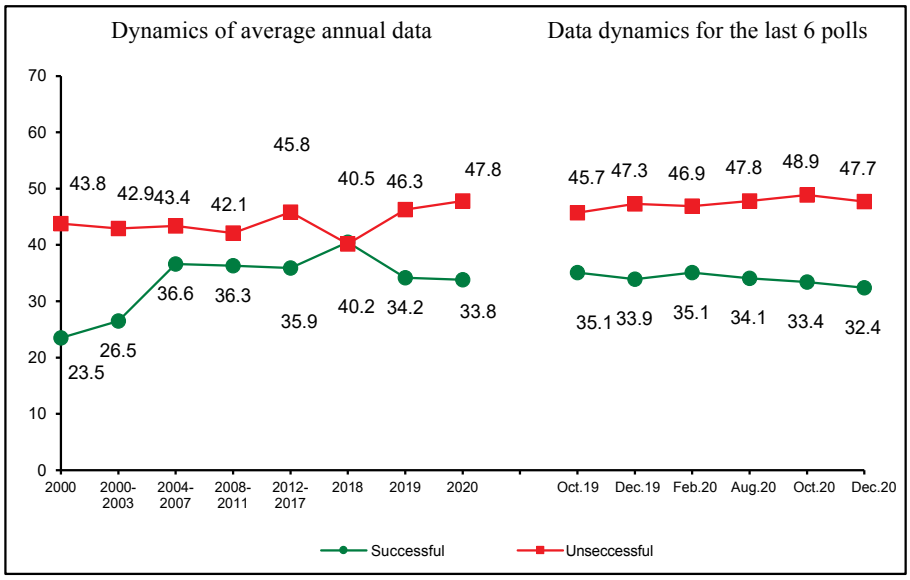
Annual dynamics (December 2020 to December 2019)	
Respond option	Dynamics (+ / –)
Successful	-6
Unseccessful	+2

Imposing order in the country



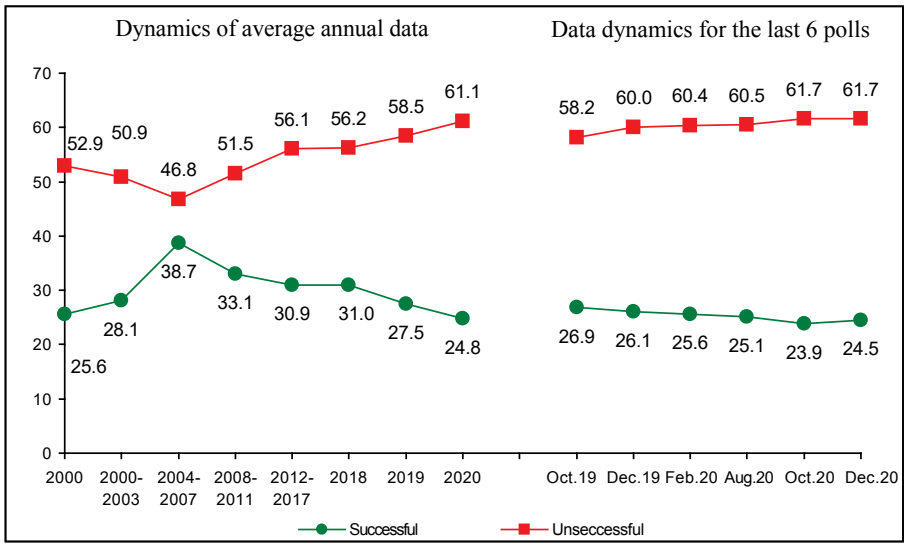
Annual dynamics (December 2020 to December 2019)	
Respond option	Dynamics (+ / –)
Successful	-3
Unsuccessful	+4

Protecting democracy and strengthening citizens' freedoms



Annual dynamics (December 2020 to December 2019)	
Respond option	Dynamics (+ / –)
Successful	-2
Unsuccessful	0

Economic recovery and increase in citizens' welfare



Annual dynamics (December 2020 to December 2019)	
Respond option	Dynamics (+ / –)
Successful	–1
Unsuccessful	+2

In October – December 2020, the structure of people's political preferences has not significantly changed: the level of support for the United Russia party is 31%, LDPR and KPRF – 7–9%, the Just Russia party – 4–5%. At the same time, the share of the Oblast's population believing that none of the political forces represented in Parliament express their interests remains high (34–35%).

The same situation was a year ago (December 2019), however, in comparison with 2018, the level of support for the United Russia party has noticeably decreased (by 6 p.p., from 38 to 32%), and the share of those who are not satisfied with any parties represented in the State Duma also increased (by 5 p.p., from 29 to 34%).

Which party expresses your interests? (%of respondents; FSBIS VolRC RAS data)

Party	Dynamics of average annual data										Data dynamics for the last 6 polls						Change (+/-), Dec. 2020 к дек. 2019
	2000	2007	2011	Election to the RF State Duma 2011, fact	2012	2016	Election to the RF State Duma 2016, fact	2018	2019	2020	Oct. 2019	Dec. 2019	Feb. 2020	Aug. 2020	Oct. 2020	Dec. 2020	
United Russia	18.5	30.2	31.1	33.4	29.1	35.4	38.0	37.9	33.8	31.5	32.8	33.7	33.2	30.9	31.1	30.9	-3
KPRF	11.5	7.0	10.3	16.8	10.6	8.3	14.2	9.2	8.8	8.4	9.1	9.2	8.9	8.6	8.8	7.3	-2
LDPR	4.8	7.5	7.8	15.4	7.8	10.4	21.9	9.6	9.1	9.5	8.3	9.4	9.9	9.3	9.4	9.5	0
Just Russia	-	7.8	5.6	27.2	6.6	4.2	10.8	2.9	3.4	4.7	4.2	4.0	4.7	4.8	4.3	5.0	+1
Other	0.9	1.8	1.9	–	2.1	0.3	–	0.7	0.3	0.5	0.1	0.1	0.6	0.4	0.3	0.7	+1
None	29.6	17.8	29.4	–	31.3	29.4	–	28.5	33.7	34.2	34.3	34.3	34.0	33.6	33.8	35.3	+1
Hesitate to respond	20.3	21.2	13.2	–	11.7	12.0	–	11.2	11.0	11.1	11.2	9.3	8.7	12.4	12.2	11.2	+2

There were no significant changes in the dynamics of estimates of social well-being over the past two months: the share of the Oblast's population who positively assess their daily emotional state is 60–61%, the share of those who think that "everything is not so bad, and it is possible to live; it is difficult to live, but it is possible to stand it" is 70–71%.

At the same time, from December 2019 to December 2020, there are obvious negative changes: the share of those who positively assess their mood has decreased by 10 p.p. (from 70 to 60%); the relative share of those who "cannot bear their plight" increased by 4 p.p. (from 17 to 21%).

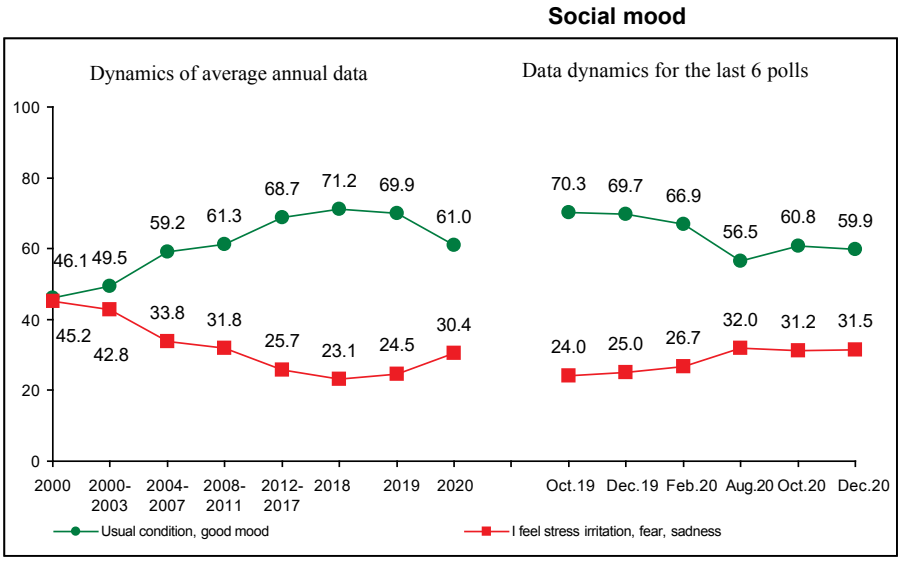
We should also note that the share of positive assessments of social mood decreased by 9 p.p. (from 70 to 61%) in 2020 in comparison with 2019, and the relative share of people who have a large stock of patience decreased by 5 p.p. (from 77 to 72%).

The structure of social self-identification has not changed in comparison with October 2020 and December 2019: nearly a half of the Oblast's residents (48–49%) subjectively refer to themselves as "poor and extremely poor"; nearly 40-41% refer to themselves as "middle-class people".

At the same time, there has been a steady trend a gradual increase of people who subjectively include themselves to low-income population groups over the last three years: in 2018 – 45%, in 2019 – 47%, in 2020 – 49% (in general for 2018–2020 – by 4 p. p., from 45 to 49%).

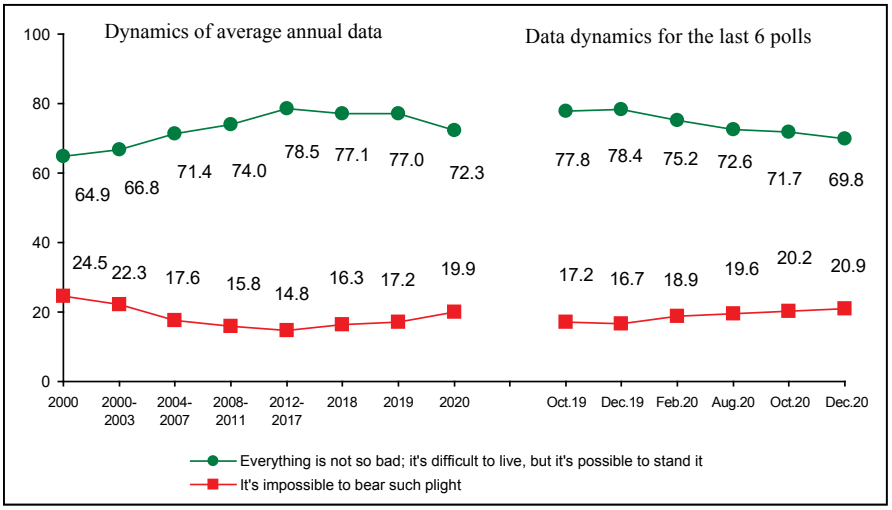
Dynamics of Consumer Sentiment Index (CSI), which shows population's predictions regarding the prospects of economic development and their personal financial situation, see negative trends in monthly and annual retrospective: over the last two months, CSI decreased by 3 p.p. (from 86 to 83%), in comparison with December 2019 – by 7 p.p. (from 90 to 83%); in 2020 compared to 2019 – by 4 p.p. (from 91 to 87%). Meanwhile, for many years (from 2007–2008), Consumer Sentiment Index has been below 100 points, which means that negative attitudes prevail in population's assessments.

Estimation of social condition (% of respondents; FSBIS VolRC RAS data)



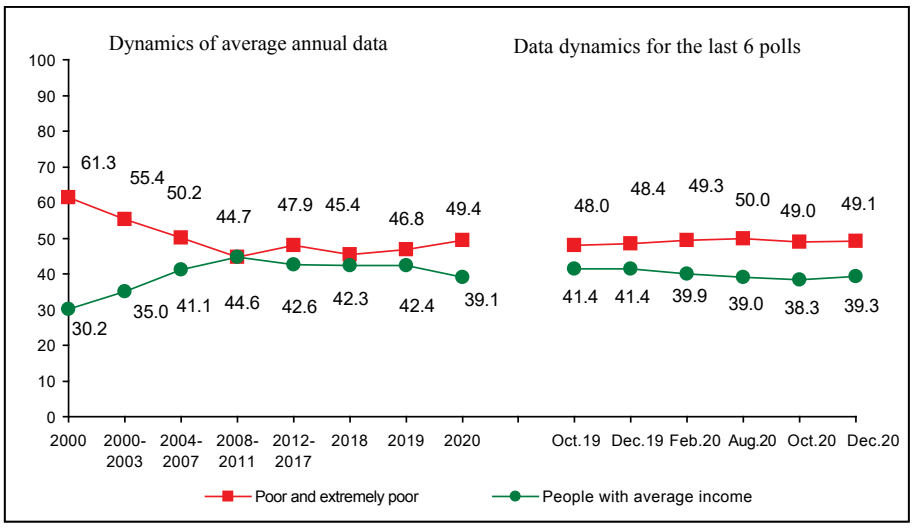
Annual dynamics (December 2020 to December 2019)	
Respond option	Dynamics (+ / –)
Usual condition, good mood	-10
I feel stress, irritation, fear, sadness	+7

Stock of patience



Annual dynamics (December 2020 to December 2019)	
Respond option	Dynamics (+ / –)
Everything is not so bad; its difficult to live, but its possible to stand it	-9
Its impossible to bear such plight	+4

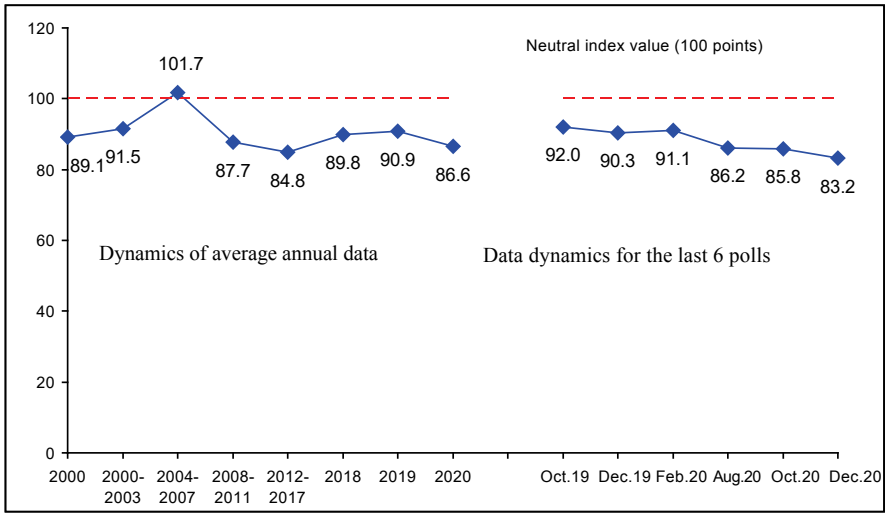
Social self-identification*



Annual dynamics (December 2020 to December 2019)	
Respond option	Dynamics (+ / –)
Share of people who consider their income average	-2
Share of people who consider themselves poor and extremely poor	+1

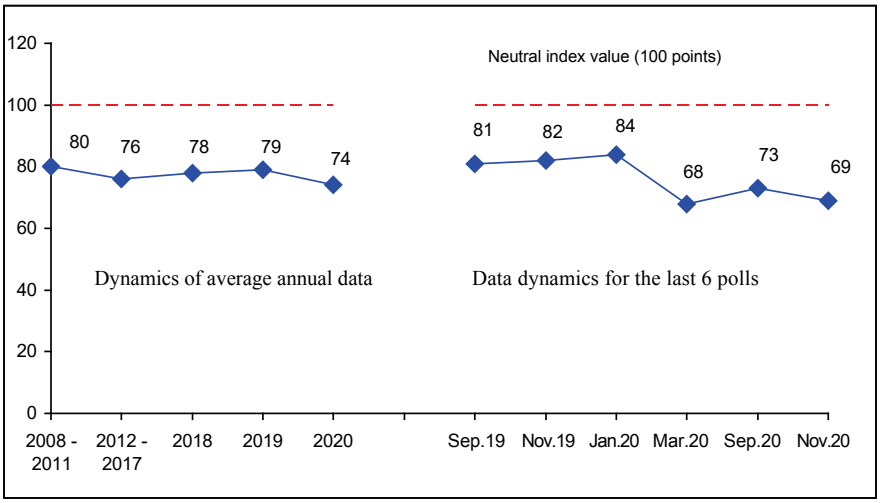
* Question: "Which category do You belong to, in your opinion?"

Consumer Sentiment Index (CSI)



Annual dynamics (December 2020 to December 2019)	
CSI	Dynamics (+ / –)
Index value, points	-7

Consumer Sentiment Index (CSI; Levada-Center data* for Russia)



Annual dynamics (December 2020 to December 2019)	
CSI	Dynamics (+ / –)
Index value, points	-13

* Index is calculated since 2008
Source: Levada-Center data. Available at: https://www.levada.ru/indikatory/sotsialno-ekonomicheskie-indikatory/

In 10 out of 14 socio-demographic population categories, there were no significant changes over the last two months.

The share of positive assessments of social mood significantly decreased in two population categories: people with secondary and incomplete secondary education (by 4 p.p., from 57 to 53%) and people who, according to self-assessments of their income, are included the category of 20% of the least wealthy residents of the Oblast (by 7 p.p., from 46 to 39%).

Besides, in October – December 2020, there was a clear increase of social mood assessments among people with higher and incomplete higher education (by 4 p.p., from 61 to 65%) and those who, according to self-assessments of their income, are included in the category of 20% of the most wealthy residents (by 5 p.p., from 71 to 76%).

Compared to December 2019, the share of the Oblast's residents positively assessing their daily emotional state decreased in all main socio-demographic categories (by 6–16 p.p.), especially among people aged under 30 (by 16 p.p., from 81 to 65%).

Negative dynamics of social mood is also recorded in annual perspective. Thus, in 2020 compared to 2019, the share of negative assessments decreased in all socio-economic groups (by 6–13 p.p.), especially among young people (by 13 p.p., from 81 to 68%).

Social mood in different social groups (respond option "Wonderful mood, normal, stable condition", % of respondents; FSBIS VolRC RAS data)

Population group	Dynamics of average annual data							Data dynamics for the last 6 polls						Dynamics (+/-), Dec. 2020 to Dec. 2019
	2000	2007	2011	2012	2018	2019	2020	Oct. 2019	Dec. 2019	Feb. 2020	Aug. 2020	Oct. 2020	Dec. 2020	
Gender														
Male	50.1	65.9	64.5	69.1	72.8	70.1	60.8	69.2	69.0	67.0	55.6	60.7	60.0	-9
Female	43.3	61.7	62.0	65.8	69.8	69.6	61.2	71.2	70.3	66.9	57.3	60.8	59.8	-11
Age														
Under 30	59.1	71.3	70.0	72.3	80.0	81.1	67.6	79.9	81.3	71.7	69.0	64.6	65.2	-16
30-55	44.2	64.8	62.5	67.9	72.6	71.2	61.8	71.1	71.9	67.5	56.2	62.5	60.9	-11
Over 55	37.4	54.8	58.3	62.1	65.2	63.3	57.4	65.1	62.6	64.3	51.9	56.9	56.5	-6
Education														
Secondary and incomplete secondary	41.7	58.4	57.4	57.2	64.8	63.2	56.1	63.4	64.0	63.1	51.7	56.9	52.6	-11
Secondary vocational	46.4	64.6	63.6	66.7	72.2	72.7	63.5	73.9	70.4	69.0	59.1	63.5	62.5	-8
Higher and incomplete higher	53.3	68.6	68.3	77.0	76.8	73.4	63.3	72.6	74.7	68.6	58.6	61.4	64.6	-10
Income groups														
Bottom 20%	28.4	51.6	45.3	51.5	57.3	53.2	43.4	54.1	50.2	48.4	40.4	46.0	38.9	-11
Middle 60%	45.5	62.9	65.3	68.7	71.9	71.4	62.6	72.6	72.6	68.4	56.6	61.9	63.3	-9
Top 20%	64.6	74.9	75.3	81.1	82.9	81.8	75.6	80.5	80.5	79.1	76.4	70.6	76.3	-4
Territories														
Vologda	49.2	63.1	67.1	73.6	71.0	68.6	60.9	70.8	68.6	66.9	57.0	61.0	58.7	-10
Cherepovets	50.8	68.1	71.2	76.2	75.8	71.2	60.4	72.0	69.9	67.3	54.4	59.3	60.7	-9
Districts	42.2	61.6	57.1	59.8	68.7	69.8	61.4	69.0	70.3	66.8	57.5	61.4	60.0	-10
Oblast	46.2	63.6	63.1	67.3	71.2	69.9	61.0	70.3	69.7	66.9	56.5	60.7	59.9	-10

CONCLUSIONS

The results of another public opinion monitoring "wave" show that there were no significant changes in the dynamics of social mood in October – December 2020. The most noticeable result of two past months is a 3% decline of Consumer Sentiment Index (from 86 to 83 p.p.): this is the lowest value of the index in the whole studied period. Moreover, the trend concerning the worsening of population's prospects on the future of the economy and their financial well-being is not unique for the Vologda Oblast; the same negative CSI dynamics is recorded in the results of all-Russian sociological studies, conducted by the Levada-Center (in September – October 2020; in general, CSI decreased by 4 points – from 73 to 69% – across the country).

However, the most concerning thing is a negative dynamics of public opinion assessments in a prolong perspective (annual and short-term) which include:

- ✓ **decrease of the share of positive assessments of the President's work (by 14 p.p.; from 66% in 2018 to 52% in 2020);**
- ✓ **reduction of the support for the "United Russia" party (by 6 p. p., from 38 to 32%);**
- ✓ **increase of the share of people who believe that none parliament parties represent their interests (by 5 p. p.; from 29 to 35%);**

✓ sharp decrease of the share of people who positively characterize their daily emotional state (by 9 p.p.; from 70 to 61%);

✓ further drop of low values of Consumer Sentiment Index (by 4 points; from 91 to 87 p.).

While analyzing such distinct negative changes in the public opinion dynamics, it is impossible to avoid consequences of the coronavirus pandemic and mass quarantine restrictions, which had an impact on daily lives of nearly everyone. However, they are not the only reasons for decreasing public mood assessments. Such negative dynamics in all key monitoring indicators were recorded in 2019 too, when there was no sign of the pandemic. In particular, in such indicators as:

✓ level of the approval of the President's work (share of positive assessments decreased by 10 p.p. (from 66 to 56%) in 2019 in comparison with 2018; similar negative trends were also recorded during all-Russian studies of VCIOM and Levada-Center);

✓ assessments of the President's success in solving key problems of the country (in all main issues, the relative share of positive assessments decreased by 3–7 p.p.);

✓ social self-identification (2% increase of the share of people who subjectively refer to themselves as "poor and extremely poor" – from 45 to 47%).

Thus, the pandemic only forced some negative processes in the dynamics of public opinion; first, it concerns the assessment of the authorities' activities as the quintessence or "litmus paper" of general situation in the country, economic state, and prospects for a personal future.

In this situation, obviously, the most important aspect is further course of the epidemiological situation in the country and in the world, as well as social and economic support measures undertaken by the authorities for supporting the level and quality of life among population.

However, we should not forget that current mood of Russian society is largely based on the implementation of constant expectations, caused by promising goals and objectives of national development announced by the RF President in Addresses to the Federal Assembly, during the last press-conference (December 17, 2020), and recorded in national goals and direct orders of the President[4].

In a long-term perspective, the realization of these social expectations (two times decrease of the poverty level, ensuring the rate of sustainable growth of population's income and the level of pension provision not lower than inflation, improvement of housing conditions and quality of urban environment, etc.) will define the nature of social mood and a total level of social tension in the country.

The materials were prepared by M.V. Morev, A.N. Gordievskaya, E.E. Leonidova

[4] For example:

On measures to implement state social policy: Executive Order of the President of the Russian Federation no. 597, dated May 7, 2012. *Official website of the President of Russia*. Available at: http://www.kremlin.ru/acts/bank/35261

On national goals an d strategic objectives of the Russian Federation through to 2024: Executive Order of the President of the Russian Federation no. 204, dated May 7, 2018. *Official website of the President of Russia*. Available at: http://www.kremlin.ru/acts/bank/43027

On the national development goals of the Russian Federation through 2030: Executive Order of the President of the Russian Federation no. 474, dated July 21, 2020. *Official website of the President of Russia*. Available at: http://www.kremlin.ru/acts/bank/45726

Index of articles published in 2020

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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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Make-up page T.V. Popova
Translators and Proof-readers N.N. Boytsova,
N.E. Entus
A.D. Kirillova

Passed for printing January 29, 2021.
Date of publication February 04, 2021.
Format 60×84 1/8. Digital recording.
Con. pr. sheets 33.5. Number of copies 500. Order No. 10.
Price is open.

The journal is registered with the Federal Service
for Supervision of Telecom and Mass Communications (Roskomnadzor).
Certificate of registration PI FS77-71361 dated October 26, 2017.

Founder: Federal State Budgetary Institution of Science
"Vologda Research Center of the Russian Academy of Sciences" (VolRC RAS)

Address of the Publisher and Editorial Office:
56A, Gorky St., Vologda, 160014, Russia
phone (8172) 59-78-03, fax (8172) 59-78-02, e-mail: common@volnc.ru