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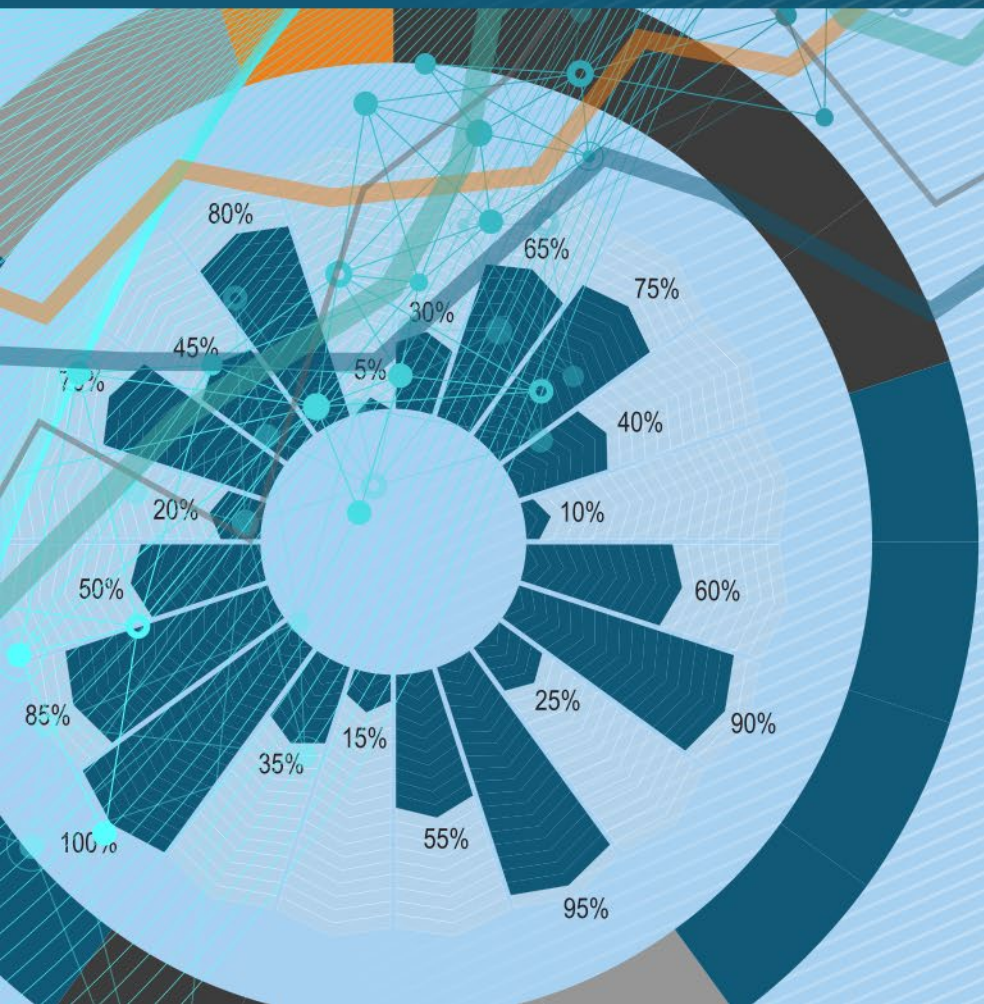

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Phone:	+7 (4852) 44-02-11
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BALANCED SCORECARD OF NATIONAL ECONOMIC SECURITY AS A COMPETITIVENESS PREREQUISITE

Marina L. Alpidovskaya

Financial University under the Government of the Russian Federation, Russia
E-mail: morskaya67@bk.ru

Aleksei M. Tsilkin

Financial University under the Government of the Russian Federation, Russia
E-mail: AMTsikin@fa.ru

Abstract. Enhancing national economic security is a key prerequisite for stable social and economic development of countries under turbulent internal and external factors. The purpose of this paper is to develop a balanced scorecard of national economic security, including competitiveness and self-sufficiency factors of the national economy. Hierarchy analysis and scoring-index method are used to achieve the objective. In the developed system, competitiveness indicators determine the efficiency of the national economic system, while self-sufficiency acts as a guarantee of sustainable development with minimal dependence on foreign partners.

Keywords: balanced scorecard, economic security, competitiveness, self-sufficiency, national economy.

JEL codes: E01, A52

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Introduction

Modern factors of chaotization of the global economic system lead to a continuous improvement of the national economic security within the appropriate state economic policy (Tsikin, Alpidovskaya, 2019). National economic security in this case reflects «the state of the national economy, which ensures guaranteed protection of national interests, sustainable social development of the country and sufficient defense capabilities even under the most adverse conditions of internal and external processes» (Gelvanovskiy, 2016). The stated purpose of the study dictates to represent national economic security as a set of competitiveness and self-sufficiency of the economy. The competitiveness of the national economy determines the efficiency of the economic system, while self-sufficiency determines the ability to develop under the conditions of negative external and internal factors. It should be noted that the issues of sustainability of the national economy have not previously appeared in other studies, but have become particularly important in the context of the COVID-2019 pandemic, which also affected risk management systems (Alpidovskaya, Savel'eva, 2020).

The state policy to stimulate the development of national economic security should be based on quantitative parameters of the country's development level and defined by group indicators and detailed to individual indicators, which is a balanced scorecard. These approaches are used, in particular, to calculate the integral competitiveness index proposed by the World Economic Forum and used as the basis for the annual Global Competitiveness Reports (WEF, 2020). The integral index proposed by the World Economic Forum is justified both from the point of view of accumulated retrospective data (World Economic Forum reports are being published since 1979), and the research scale (the analysis covers more than 140 countries). At the same time, it should be further developed in terms of taking into account factors of stability of national economies and including micro- and mesolevel indicators based on the details of national economic security in modern economic realities.

Here is the general mathematical formulation of the problem (Formula 1):

$$U^*=\{ u_i^* \mid u_i^* \succ^{\mathcal{P}} u_j \; ; j \neq i \; \forall \; u_j \in U; j = \overline{1,n} \quad (1)$$

where
U* is the set of ranked national economies;
U is the set of studied national economies;
$u_i = \{a_{im}\}$ is an element U of the set of national economies, i=1,n;
m is the number of considered indicators of economic security of the i-th national economy;
n is the total number of national economies under consideration;
$\succ^P$ is the system of preferences P in the set of vector estimates of the element — national economy.
To solve the studied task, it is necessary to go through the following stages:
1) form a list of national economic security indicators;
2) convert economic security indicators into scores;
3) determine the weights of economic security indicators;
4) calculate the integral index of national economic security.

Forming a consolidated list of national economic security indicators

The indicators of national economic security are chosen depending on the basic models of formation of competitive advantages and sustainability of the national economy. It is advisable to consider the neo-industrial model of development as a strategic benchmark for the Russian economy. Researchers all over the world define the essence of neo-industrialism as using electronics and informatics across the entire manufacturing industry — the industrial Internet of Things (Gubanov, 2014).

The most important aspect of the new industrialization is the automation and computerization of the manufacturing, which leads to the digitization of the national economy, the replacement of resource- and labor-intensive work with the products of information and communication technologies. The basis of competitiveness in neoindustrialism is digital technologies, nanotechnologies, biotechnologies, eco-friendly technologies. Their development is accompanied by the emergence of network effects (Alpidovskaya et al., 2018).

If the balanced scorecard of national economic security aids the development of competitiveness and self-sufficiency within the neo-industrial development model, the integral indicator of economic security of the national economy will reflect competitiveness and self-sufficiency dynamically and will be cleared of momentary factors. The existing approaches should be assessed critically to compile the list of private indicators of the main identified groups. To date, the World Economic Forum (WEF, 2020) and International Institute for Management Development (IMD, 2020) approaches are considered to be the most developed methodologies, although not perfect. In particular, R.A. Fathutdinov points out the shortcomings of common practices which arise from ignoring the parameters of the quality of goods, depreciation of fixed assets, the level of higher education, innovation activity of organizations, quality of life and other elements (Fathutdinov, 2003).

Social indicators are among the most significant in modern interpretations of national competitiveness. Today the classical GDP per capita indicator does not allow for a full assessment of the competitiveness of countries in a social context. Considering the indicators adopted in the Russian statistics, four indicators directly related to the population's income were selected for the balanced scorecard of the national economic security: average income per capita and real disposable income of the population, the ratio of average income per capita to the minimum wage and the share of the population with incomes below the poverty line. This group of indicators makes it possible to fully assess the material component of social indicators of national competitiveness, and is sufficiently well represented both in the methodology of major international competitiveness rankings and in various studies. A similar approach for competitiveness analysis, in particular, was used in a number of papers (Belyakova, Sumina, 2010).

Money, environmental, health, housing, and safety factors have a direct impact on the standard of living of the population. These indicators are particularly important because they allow us to fully assess the standard of living of the population, which is impossible when analyzed solely in money sums. For the

population, housing, medicine, and low crime rate form a favorable environment, which is beneficial for the development and full use of national human capital. The environmental indicator of production and consumption waste generation in the structure of the developed system of economic security indicators also seems relevant along the current trends of most global national competitiveness rankings.

The fundamental role of social factors of competitiveness and their conditioning on environmental security are described in many studies (Drobot, 2014). At the same time, the authors tend to limit themselves to a rather narrow area of other competitiveness indicators and include resource indicators (natural and climatic conditions, geographical location and others), the development of which is difficult to implement.

Without belittling the importance of resource factors, we should rather discuss the fullest use of national resources, which ensures self-sufficiency of the economy and should act as one of the main development directions of the Russian economy. Probably, it is important to consider the resource resource to select individual regional programs of competitiveness development, which can be based on the formation of spatial and temporal reproduction clusters (Sokolov, 2017).

What is included in the list of innovation indicators of competitiveness of the national economy is equally important — it is possible to analyze both in terms of prerequisites formed by the state economic policy (shares of state budget expenditures on research and average salaries of researchers), and in terms of results obtained in the innovation process (the number of organizations performing research and development; the number of employees engaged in research and development, and the share of innovative enterprises in the total structure). The performance of innovative enterprises should additionally be assessed (an indicator called «the number of issued patents and other copyright documents»), which makes it possible to include indicators of the meso-economic level into the list of national competitiveness indicators. Also as part of the system of indicators of national economic security, we propose the microeconomic characteristics (the share of products of innovative enterprises in the overall structure). They can be used to comprehensively assess the innovative competitiveness at all levels, which is consistent with the standing of R.A. Fathutdinov (Fathutdinov, 2003).

Technological indicators of national competitiveness are among the main ones needed for new industrialization and have properties of the generalized amount of fixed assets (cost of fixed assets), their condition (depreciation of fixed assets), and prospects for renewal (investment in fixed capital). In addition, the prospective model assesses the compliance of production assets with the modern technological level and digitalization of technological processes (indicators «number of advanced technologies used» and «number of personal computers per 100 employees», respectively). Technological indicators of national competitiveness represent fundamental elements of economic development in A.V. Ishhanov's study (Ishhanov, 2004). However, its author directly associates technological development with foreign direct investment, which does not seem quite justified in Russia. Relying on domestic sources of investment and economic growth seems more promising nowadays.

Labor indicators of the promising model of national development include macroeconomic factors of the overall level of employment and unemployment, as well as the prospective national labor force (the number of students of higher and secondary vocational educational institutions per 10,000 people). The last indicator characterizing the state economic policy in labor is the share of state budget expenditures on education. It can be used in a qualitative forecast of the development level of the Russian population. A similar set of private indicators of this group is proposed in the thesis work of N.N. Obrezkov: unemployment rate, the number of students in higher and secondary vocational education, wages (Obrezkov, 2006). However, it seems necessary to draw a line between social and labor indicators, as well as to assess the prospects of Russian education through the indicator of the share of state budget expenditures on education. The four groups proposed by the author also should not limit the assessment (natural resource potential, labor resources, scientific, technical, and technological potential, money and property).

Infrastructural indicators of national economic competitiveness contain indicators of physical development (density of railways and roads), secondary indicators of population mobility (number of passengers transported), and indicators that allow to indirectly assess business prospects in the country

(number of commodity exchanges and banks). Infrastructural factors of national competitiveness contribute to the favorable environment for business, the level of development of which (associations, networks, clusters) is the main factor of growth of competitiveness of Russian economy (Kundius et al., 2013). Despite the obvious importance of infrastructure for the development of the Russian economy, the Russian researchers usually do not include the indicators of this group in the models of national development.

The final group of indicators of national development are self-sufficiency indicators which let the researchers determine the country's dependence on import supplies. The indicators of this group include the export quota, import quota, foreign trade quota, ratios of elasticity of imports and exports to GDP. The indicators of this group have not been previously analyzed in the scientific and methodological literature and are introduced in the national economic development model for the first time. As noted earlier, national self-sufficiency acts as an indicator of economic sustainability, which seems a more promising approach than the allocation of financial indicators and factors to describe this indicator of economic security considering the specific aspects of Russia (Grishin, 2005).

It should be noted that the set of the presented indicators is not complete, it only includes the most significant of them. Their estimates can be obtained from the official reports of Rosstat (Russian State Statistics Agency). However, if necessary (due to the new statistics and/or knowledge of the modern society and the Russian social and economic system), the groups and individual indicators within the developed model can always be adjusted.

Thus, Table 1 presents the recommended list of indicators for the balanced scorecard of national economic security. It is based on the critical analysis of world rankings and publications devoted to assessing the competitiveness of the national economy and issues related to the development of sustainability of the national economic system. It also considers the approaches and recommendations discussed earlier, as well as the availability of the proposed indicators in the Russian state statistics.

Table 1 - Recommended indicators of national economic security

Group	Indicators
Society	average per capita income
	real disposable income
	ratio of average per capita income to minimum wage
	the share of the population with incomes below the poverty line
	housing security
	physician availability
	crimes reported
	generation of production and consumption waste
Innovations	organizations performing research and development
	employees engaged in research and development
	share of state budget expenditures on scientific research
	patents and other protective documents issued
	share of innovative enterprises in the total structure
	share of products of innovative enterprises in the total structure
	average salary of researchers
Technology	fixed assets cost
	fixed assets depreciation
	fixed assets investments
	personal computers per 100 employees
	advanced technologies in use

Group	Indicators
Labor	employment rate
	students of secondary vocational educational institutions per 10,000 people
	higher education students per 10,000 people
	unemployment rate
	the share of state budget expenditure on education
Infrastructure	railroad density
	automobile road density
	passenger traffic
	number of commodity exchanges
	banks
Digitization	percentage of organizations that have Internet access (narrowband, fixed broadband, and mobile broadband)
	share of organizations using cloud services
	share of organizations offering customer communication, data protection, online shopping and other services on the corporate website
	share of organizations using the Internet to interact with authorities and accounting, staff management
	share of organizations using ERP systems
Self-sufficiency	export quota
	import quota
	foreign trade quota
	ratio of elasticity of imports to GDP
	ratio of elasticity of exports to GDP

Source: composed by authors

Point conversion of economic security indicators of national economies

The analysis of indicators of economic security of national economies, which were adopted to form an integral indicator of national economic security in ranking, and their values showed that these indicators are heterogeneous and defined by assessments of different measurement scales. For this purpose, it is necessary to bring the values of indicators to a unified measurement scale.

This is why the study (figure) uses an algorithm of transformation of competitiveness and self-sufficiency indicators (and their ranges) into point estimates. A scale of 1 to 9 is used to convert national economic security indicators. This scale applies 9 as the maximum and 1 as the minimum value.

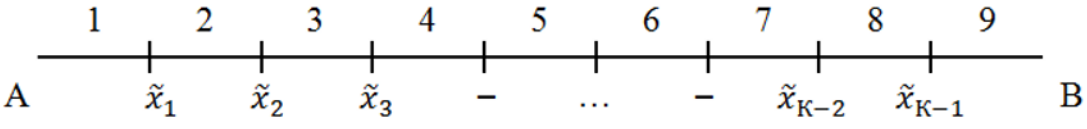

Figure 1. Scale of conversion of actual indicator values into points

Source: composed by authors

Here is the algorithm used to convert the national economic indicators (or their ranges) into the point system.

Let there be a set of objects $\{O_j\}$ with dimension x_j. Let A be the minimum of all values in x_j, B — the

maximum of all values in x_j.

To build a scale with K gradations, calculate K-1 the value (i=1,…,K-1) as per Formula 2:

$$\widetilde{x_i} = A \cdot \left(\frac{B}{A}\right)^{\frac{1}{2K-2}} \cdot \left(\frac{B}{A}\right)^{\frac{2(i-1)}{2K-2}} \quad (2)$$

For a nine-point scale, where the K=9 calculation would look as follows (Formulas 3-10).

$$\tilde{x}_1 = A \cdot \left(\frac{B}{A}\right)^{\frac{1}{16}} \quad (2)$$

$$\tilde{x}_2 = A \cdot \left(\frac{B}{A}\right)^{\frac{3}{16}} \quad (2)$$

$$\tilde{x}_3 = A \cdot \left(\frac{B}{A}\right)^{\frac{5}{16}} \quad (2)$$

$$\tilde{x}_4 = A \cdot \left(\frac{B}{A}\right)^{\frac{7}{16}} \quad (2)$$

$$\tilde{x}_5 = A \cdot \left(\frac{B}{A}\right)^{\frac{9}{16}} \quad (2)$$

$$\tilde{x}_7 = A \cdot \left(\frac{B}{A}\right)^{\frac{13}{16}} \quad (2)$$

$$\tilde{x}_8 = A \cdot \left(\frac{B}{A}\right)^{\frac{15}{16}} \quad (2)$$

If the value of the indicator is $x_j < \widetilde{x}_1$, it gets 1 point, all $\widetilde{x}_i \leq x_j < \widetilde{x}_{2+1}$ (i=2,…,K-1) get i points and all $x_j \geq \widetilde{x}_{K-1}$ get 9 points.

This algorithm can be used to establish the link between the values of competitiveness and self-sufficiency indicators and their point estimates for each indicator of national economic security.

Figure shows the scheme of the scoring algorithm depending on the indicator values.

Calculation of weights of economic security indicators of national economies

To determine the weights of indicators of economic security of national economies, we propose the hierarchy analysis. It is based on the system of principles introduced by T. Saati. The system relies on the well-developed theory of representation of judgement weights by eigenvalues of matrices (Saati, 1993). The hierarchy analysis method makes it possible to switch the complex task of choosing between several alternatives with solving a set of simple factors pairwise comparison problems. The first step is to compile a matrix of pairwise comparisons. The alternatives (indicators) to be compared are put in the rows and columns of the matrix in the same order. The main diagonal is filled with 1s. The expert makes a pairwise comparison of the alternatives against each other. The results are recorded in the corresponding cells of the matrix. The choice depends on the answer to the following question: «How much preferable is the alternative presented

in the row of the matrix to the alternative presented in the column»? The superiority of one alternative over another is expressed by a number (the higher the superiority, the higher the number). Absolute superiority is equivalent to 9 on the Saati scale, and equal importance is 1 (Table 2). Intermediate and inverse values are also allowed in the matrix of pairwise comparisons. In the latter case, this means that the alternative in the column of the matrix is more significant than the alternative in the row.

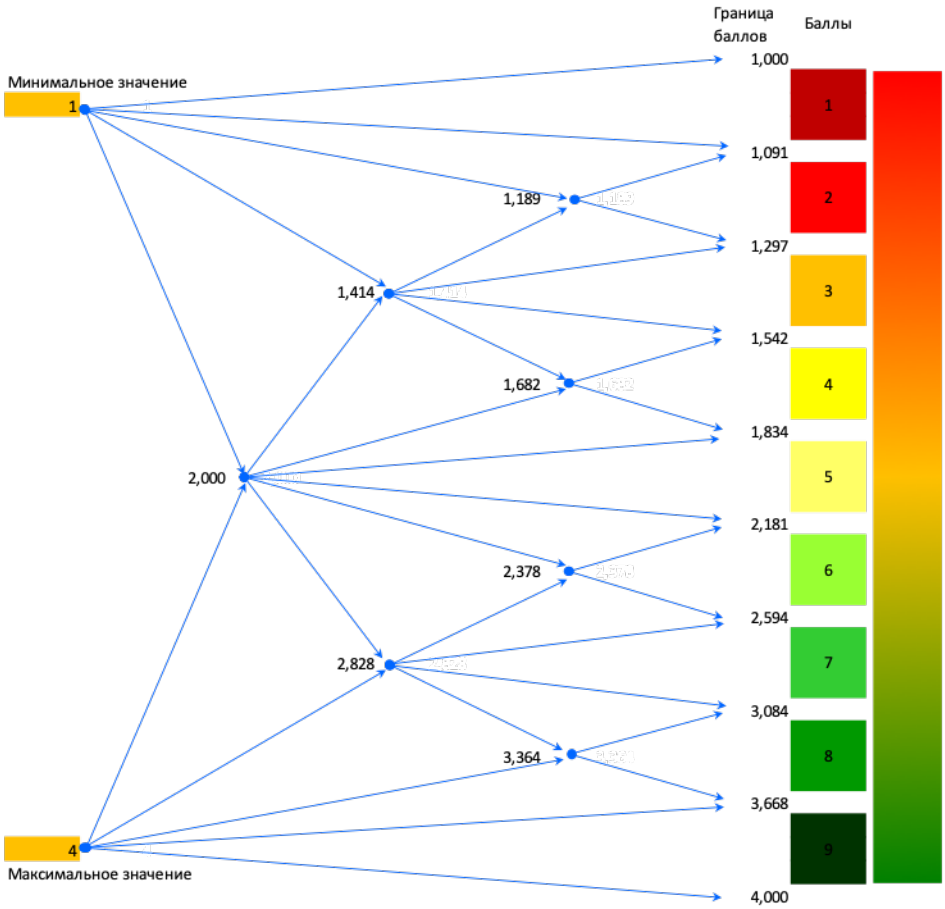

Figure 2. Scheme of the scoring algorithm depending on the indicator values
Source: composed by authors

Table 2 – Saati scale

Preference rates	Quality preference level	Explanation (the expert believes that...)
1	Equal	Two indicators are equally important
2	Intermediate value	
3	Slight superiority	The first indicator in the pair being compared is somewhat more important than the second one
4	Intermediate value	
5	Considerable superiority	The first indicator in the pair being compared is considerably more important than the second one
6	Intermediate value	
7	Clear superiority	The first indicator in the pair being compared is clearly more important than the second one
8	Intermediate value	

Preference rates	Quality preference level	Explanation (the expert believes that...)
9	Total superiority	Undoubtedly, the first indicator in the pair being compared is absolutely more important than the second one

Source: Saati, 1993

Let us introduce a matrix of pairwise comparisons A, which consists of n rows and n columns corresponding to the alternatives chosen for comparison. Multiply the elements in each row and extract the root of the n-th degree (geometric mean method). The obtained values will be approximate eigenvectors of the matrix (Formula 11):

$$a = \sqrt[4]{\frac{w_1}{w_1} * \frac{w_1}{w_2} * \frac{w_1}{w_3} * \frac{w_1}{w_4}};$$

$$b = \sqrt[4]{\frac{w_1}{w_1} * \frac{w_1}{w_2} * \frac{w_1}{w_3} * \frac{w_1}{w_4}}; \quad (11)$$

$$c = \sqrt[4]{\frac{w_1}{w_1} * \frac{w_1}{w_2} * \frac{w_1}{w_3} * \frac{w_1}{w_4}};$$

$$d = \sqrt[4]{\frac{w_1}{w_1} * \frac{w_1}{w_2} * \frac{w_1}{w_3} * \frac{w_1}{w_4}};$$

$$S=a+b+c+d,$$

where

w_i/w_j is an expert assessment of the degree of superiority of alternative i over j.

The column of numbers (a, b, c, d) is normalized by dividing each number by the sum of all numbers (Formula 12):

$$\alpha_1 = \frac{a}{S};\ \alpha_2 = \frac{b}{S};\ \alpha_3 = \frac{c}{S};\ \alpha_4 = \frac{d}{S}. \quad (12)$$

The values α_1, ...α_4 are local priorities of the matrix of pairwise comparisons and reflect the weights of indicators of economic security of national economies.

Next is the algorithm used to assess the weights of indicators of economic security of national economies.

Step 1. Compile a matrix of pairwise comparisons of economic security indicators.

Step 2. The expert performs a pairwise assessment of all indicators of the matrix. The expert answers the following question: «What proportion of the total increase in national economic security resulting from improved values of all indicators of competitiveness and self-sufficiency does this indicator provide compared to another»?

Step 3. After filling in the matrix of pairwise comparisons as per the previous algorithm, calculate the weights of indicators of economic security of national economies.

Calculation of the integral index of national economic security

The integral indicator of economic security of the national economy is calculated as a weighted sum of point estimates of indicators of competitiveness and self-sufficiency, taking into account their importance (the weight of the economic security indicator), which is determined by Formula 13:

$$F_\Sigma = \sum\sum \propto_i \cdot \beta_j \cdot W_{ij,} \quad (13)$$

where
F_{Σ} is the integral indicator of national economic security;
α_i is the weight of the i-th group of indicators,
β_j is the weight of the j-th indicator of the group of indicators,
W_{ij} is the point estimate of the i-th significance indicator of the j-th group

Some of the advantages of this method are:

- national economic security is determined not only by the technological and economic development of the country, but also by political, social, environmental, and other indicators that correspond to modern concepts of social and economic development of countries;
- the national economic benefits are properly aligned with the competitiveness and self-sufficiency, as well as national economic security in general;
- there is an opportunity to develop measures within the state economic policy to ensure sustainable social and economic development considering the turbulent internal and external factors.

The last point also directs that one of the main principles of the proposed balanced scorecard of national economic security is its relative nature, i.e., it is possible to compare the performance of the national economy with that of other countries. Obviously, no state has the best values of all indicators in the world, but the lag of indicators, considering the weight from the norm (world best practices), gives an idea about the problems of the national economy and promising directions of social and economic development of countries.

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COMPETITIVENESS AS THE RESULT OF MARKET ECONOMY AND DEVELOPMENT FACTOR OF SOCIAL AND ECONOMIC SYSTEMS

Bella G. Shelegeda

Donetsk academy of management and public administration, Ukraine
E-mail: shelegeda.bg@gmail.com

Nataliya V. Pogorzhelskaya

Donetsk academy of management and public administration, Ukraine
E-mail: pnv686@gmail.com

Abstract. The study is devoted to methodology of integrated approach to problems of market relations development based on the apparent advantages of applied statistics used to draw theoretical conclusions and recommendations. Particular attention is paid to competitiveness as a result of market relations and competition as a factor in the development of economic systems. Analysis of the dynamics of Russian development in resource structure allowed us to establish the most important tasks for increasing the competitiveness of the country's economy in the new crisis conditions. Among the resources for forming an effective development strategy at the regional level, there are significant reserves in the financial mechanisms of redistribution of the federal budget.

Keywords: market economy, competitiveness, research methodology, indicators, statistics, factor analysis, financial resources, social and economic development.

JEL codes: A10; B41; C80; E01; E62; G18

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Introduction

The formation and establishment of a market economy in Russia happened at the same time as the changes in the forms of public administration, the emergence of private property, the redistribution of resources between territorial and economic entities, individual industries, and industrial and financial corporations.

The first references to market relations in the Russian economy, which had replaced the centralized government control, can be found in the international publications, and then in Russian ones, from the late 80s to early 90s. (Shestakov, Khaitkulov, and Samulkin, 2007; Polynov and Tarasova, 2017). They analyze the negative consequences brought by the chosen course of reforms through de-industrialization of economy, the increase in importance of raw materials, destruction of core technology, population impoverishment, decrease of food independence within the country, worse ecological situation, degradation of education and culture.

The general methodological approach to economic research in the transition period corresponded to the formula: «yes to market economy, no to market society — refusal to understand the unity of market mechanisms and state regulation is a typical example of modern stereotypes of mass consciousness, and the fight against stereotypes and myths was and remains a scientific and civic duty of scientists...» (Abalkin, 2010).

By that time, the countries have separated into the ones with the developed market relations and the one with the developing ones, but also the countries which form the new management processes. At the same time, the relationship was formed between the level of market relations and social and economic, technical and technological development of individual systems with their characteristic territorial features. Moreover,

a direct correlation was implied between the state of market mechanisms and the level of development in Russian studies, which by no means corresponded to the real practice. Thus, the second and third world countries that form the market economy, can in no way be classified as developed or even developing judging by the level of aggregate resource potential (Khoros, Malysheva, 2013).

As for the Russian economy, the practice of introducing market levers of public administration was ahead of scientific comprehension and development of new methodological approaches to the study of radical transformations that were taking place and were gaining momentum in the country.

Methodological study basis

Methodological approaches to the economic research of that time were obviously different, but on the one hand, there is an apparent continuity, and on the other hand, a certain lack of clarity, which led to a variety and some contradictions in the terminology of basic concepts, confusion in the classification of indicators and factors affecting market processes.

It is impossible to consider the entire set of problems of formation and development of market relations in Russia in a single publication, so this study raises the following issues, which are arguably the most pressing and least covered in scientific publications. These issues are:

- the need for applied statistical support of theoretical conclusions and recommendations, without which it is impossible to ensure the practical implementation of the declared strategic development programs (projects) of economic systems of any level of management (macro-, meso-, micro-), which see the categories and separate factors of internal and external impact determined;

- to single out the most important, frequently mentioned and, undoubtedly, market-oriented economic categories, first of all — competitiveness and competition, which were first allowed to be mentioned in Russian papers no earlier than the 90s of the last century;

- to highlight and reveal the essence of financial resource contents and its impact on development, recognized in most studies as an efficiency factor, but without specifying the mechanism of impact on competitiveness in the system of state regulation by coordinating the interests of federal and local budgets.

The concept of «theoretical economy» proposed by the authors (Gordeev, Mayorova, Markin, Shkiotov, Ugryumova, 2019) «based on the principle of polymethodology» has unique qualities, giving it the right to serve as a common fundamental basis for the study of modern problems, focusing on objective philosophical and economic laws and fundamental provisions of classical and neoclassical political economy, especially on the strategic development of all levels of government.

Based on the analytical review of scientific publications, we proposed new opportunities for combining the advantages of theoretical and applied approaches (Shelegeda, Kornev, Pogorzhelskaya, 2020). Using statistical data, the authors' position on the simultaneous functioning of equilibrium and non-equilibrium states of economic systems is justified. Modern development theory recommends using the principle of dialectical unity of theoretical and applied research, which meets the challenges of increasing intensity of quantitative and qualitative changes in the modern world, and allows us to disagree with the opinion of some scientists about the bias of empirical research methods (Table 1).

Table 1 - Dynamics of social and economic development of Russian regions

Years	Indicators	Federal districts								Total	Average
		Central (CFD)	North Western (NWFD)	Southern (SFD)	North Caucasian (NCFD)	Volga (VFD)	Ural (UFD)	Siberian (SFD)	Far Eastern (FEFD)		
2005	GRP, trillion rubles	6.3	1.8	0.9	0.4	2.8	3.1	1.8	1.0	18.0	2.3

Years	Indicators	Federal districts								Total	Average
		Central (CFD)	North Western (NWFD)	Southern (SFD)	North Caucasian (NCFD)	Volga (VFD)	Ural (UFD)	Siberian (SFD)	Far Eastern (FEFD)		
	%	34.8	10.0	5.2	2.0	15.5	17.1	10.0	5.4	100	12.5
	GRP per capita, thousand rubles	164.9	130.8	67.6	39.1	91.6	254.1	103.3	113.0	125.7	120.5
2010	GRP, trillion rubles	13.4	3.9	2.3	0.9	5.7	5.1	3.8	2.4	37.7	4.7
	%	35.7	10.5	6.2	2.4	15.1	13.6	10.2	6.4	100	12.5
	GRP per capita, thousand rubles	350.2	289.6	168.8	94.9	190.7	423.5	222.9	287.7	263.8	253.5
2015	GRP, trillion rubles	22.7	7.2	4.6	1.7	10.1	9.1	6.4	4.0	65.8	8.2
	%	34.5	11.0	7.1	2.6	15.3	13.8	9.7	6.1	100	12.5
	GRP per capita, thousand rubles	580.7	520.3	283.9	176.4	339.1	737.3	369.3	487.9	449.1	436.8
2018	GRP, trillion rubles	29.4	9.0	5.8	1.9	12.5	12.8	8.3	5.2	85.0	10.6
	%	34.6	10.6	6.9	2.3	14.7	15.0	9.8	6.1	100	12.5
	GRP per capita, thousand rubles	747.5	645.7	355.6	197.2	423.1	1032.5	484.4	634.2	578.7	565.0
2018 to 2005	GRP, trillion rubles	468.5	500.9	624.8	551.6	445.4	412.6	461.2	536.0	471.2	500.1
	%	99.4	106.3	132.6	117.1	94.5	87.6	97.9	113.7	100	106.1
	GRP per capita, thousand rubles	453.3	493.7	526.0	504.3	461.9	406.3	468.9	561.2	460.4	484.6

Source: composed and calculated by the authors

As follows from Table 1, the share of federal districts in the total gross regional product (GRP) of Russia for the period 2005-2018 did not change significantly, which to a certain extent may indicate some inertia of development. If we consider the absolute figures, the contribution of the Central Federal District, which provides more than 1/3 of the country's GRP, is almost 1500% higher than of the North Caucasian Federal District. At the same time, the difference in per capita GRP calculations in these districts was 4.22 at the beginning of the period, and even decreased to 3.79 by the end of the period. The Urals Federal District (5.24) is notable for this indicator. All the while, the developing regions (NWFD, SFD, NCFD, FEFD) show the highest growth rates of these indicators. It is also noteworthy that some regions tend to grow steadily, albeit marginally, while others are subject to tangible fluctuations in these indicators, which reflects dependence of individual regions on the volatility of external market conditions.

Development, as a multi-dimensional and multi-vector process, involves profound changes in the technical, economic, social, and political areas. Modern economic theory fills, firstly, the existing historical and logical gap between the fundamental developments of the Soviet school of political economy and modern scientific approaches. Secondly, this concept can be used by representatives of various economic schools with a certain degree of adaptation to the general scientific and applied methodology, which allows to «successfully

integrate» into the methodology of institutional analysis (Sukharev, 2013; Frolov, 2016). Thirdly, the outlined approaches contribute to the effective structuring of various directions and problems of economic research.

Study contents

The development of the market environment creates new conditions that change the general competition from using territorial and resource advantages to dynamically changing scientific and technological achievements at all stages from the creation of goods to their transfer from producer to consumer.

The notion of competitiveness, despite numerous interpretations, has not yet received a universally accepted definition, although their number is constantly growing - from a few in the middle of the last century to more than 400 at present (Bieńkowski, 2008). Two directions of competitiveness research have formed in economic theory. The first one is based on classical competition theory (Chamberlain, 1936; Stigler, 1975; Hunt, 2011) which, in turn, is based on the market theory, the other one insists on the inverse relationship and studies the role of the state in the market economy, and the subject of competitiveness is the industry. In particular, it is noted that «...a firm's success in competing with competitors depends primarily on the state of affairs in the country» (Porter, 2000). «A competitive product will not emerge without an effective flexible producer. The economic mechanism of the country should be competitive» (Dubinin, 1990).

At the micro level, the term «competitiveness» means the rivalry between a certain number of economic agents who perform their activities in order to maximize profits and ensure economic growth, i.e., the ability to meet the quality and price requirements of the competitive market and customer needs compared to others on the market.

At the macro level, competitiveness reflects the capacity to generate constantly growing real incomes of the population and to improve living standards. In turn, the achievement of social and environmental objectives complements the notion of competitiveness and expands the set of indicators reflecting it.

Improving the competitiveness of the national economy is one of the main objectives of state policy. The importance of identifying the factors that affect this indicator with the development of new technologies and forms of interaction of economic entities is steadily increasing. Furthermore, experts (ECE, 2019a) agree that the gap between developed, developing, and least developed countries will become increasingly difficult to bridge in the future. Developed countries with new technologies and a high level of human capital are capable of ensuring long-term competitiveness of their economies and their goods on the international market.

The ongoing debate about the nature of competitiveness has led, firstly, to a concept that was initially applied only to national economies and then increasingly has been used at other levels, including regionally. Secondly, there is still a debate whether GDP per capita is an appropriate measure of living standards, which is a key factor in the context of analyzing competitiveness through productivity.

Different concepts of competitiveness of national economies correspond to the same attempts to explain the reasons for its growth. More often than not, these reasons include the possession of natural wealth; availability of cheap labor; beneficial macroeconomic parameters; effective economic policy.

Russian economists, in contrast to foreign authors (Hindle, Williamson, 1995) paid close attention to the problem of competitiveness in the crisis year of 1998 at macro, meso, and micro levels (Gelvanovsky, Zhukovskaya, Trofimova, 2008).

Later, the territorial approach was used (Seleznyov, 1999), and to determine the competitiveness of the region, it was proposed to find out the need to achieve a high standard of living of the population; efficiency of the region's economic mechanism functioning, its investment attractiveness, and financial competitiveness (Ushvitskii, Parakhina, 2005).

Currently, regional competitiveness attracts researchers in terms of the ability of economic entities to profitably manufacture products that meet market requirements, which coincides with the development strategy and are provided with optimal resource productivity (Mirgorodskaya, 2005; Deryabina, Kolchin, 2005; Beketov, 2008), This allows to consider regional competitiveness as the result of the macroeconomic action of objective economic laws of market relations development.

As a result, it can be argued that

- the concept of competitiveness changes depending on the goals and objectives of the study, the requirements of the subjects of market relations (consumers, competitors, investors, partners), and the scale of activities (domestic, foreign markets) in the current time and prospects that determine the strategic potential of economic growth;

- competitiveness due to the dubious assessment of the existing economic entities in solving the problems of strengthening market positions in foreign markets does not have a strict management hierarchy (enterprise, industry, region, state);

- not all of the recommended methodologies are applicable for assessing the competitiveness of individual market subjects, which leads to incomparability of calculated indicators and criteria, distorting the real level of economic practice.

In order to coordinate the actions of certain producers at different levels of management in the development and adoption of recommendations to improve economic growth models, a systematic conceptual and methodological apparatus should be formed that allows to evaluate the competitiveness of each participant of the market process, on the one hand, and, on the other hand, in the system of hierarchy of management levels (Klimov, Drozd, 2010). The parameters for assessing the level of competitiveness of the lowest level should be included as basic variables in the parameters for assessing the highest level: enterprise - industry - region - cluster - state. But at the same time, it is necessary to take into account the divergent positions on the issue of the relationship between different levels of competitiveness (Andrianov, 2000; Emelianov, 2001; Loginova, 2009).

Some of the best known and most frequently cited approaches to assessing competitiveness include computational indicators, including global, regional, national, and specialized rankings (ECE, 2019b).

A special place in modern scientific research is taken by the generalized analysis of factors and conditions determining the formation and development of competitiveness as an important indicator characterizing the degree and prospects for the development of economic systems at all levels of government. These include:

- ensuring effective economic growth rates required for the inflow of investment, increased productivity of labor and resources, intensification of entrepreneurial activity, including small and medium-sized business in the conditions prevailing in the country, regions, industries, and individual sectors of the economy;

- inclusive growth through equal access to education, health care, adequate sanitation and safety; social inclusion in the manifestation of freedom and the development of interaction in social, economic, and political groups; equitable distribution of the benefits of economic growth;

- reduction of risks threatening economic growth taking into account the potential of natural resources per capita, aggravation of environmental problems; disruption of macroeconomic stability with increasing threats of financial and economic crises and challenges.

As already mentioned, the list of indicators and factors forming a weighty potential for increasing competitiveness includes a very important parameter, which is the availability of necessary financial resources with an effective cash flow management mechanism. Budget regulation acts as a set of tools and levers that coordinate the financial relationship between the federal state and local authorities.

During formation of a certain level of regional competitiveness, the system of inter-budgetary relations has a decisive impact on the strategic resource potential of territorial development. At the same time, the resulting impact of budgets of different levels on the competitiveness of regions is manifested in their social and economic function of coordinating the relationship between public authorities, economic entities, and the population. The main objective of competitiveness in this function is to create an optimal territorial structure of the tax system using an efficient model of revenue distribution between different levels of hierarchical governance (Sugarova, 2019a). Within the federal structure and high internal regional differentiation, the issues of increasing competitiveness should be considered in relation to the management of the consolidated budget.

Modern scientific publications, for the most part, recognize the need for financial resources, but have not yet defined the content of fiscal sustainability and its role in the development of competitiveness (Sorokina, 2016; Rodina, 2020a), although earlier studies recognized budget stability as dependent on budget execution

(Masiuto, 2013; Suspitsyn, 2015). The role of a regional authority can only be fulfilled when the necessary level of competitiveness is created at its own expense. In more recent academic papers, the stability of budget revenues has been considered through pre-risk outflows and increasing the share of tax and non-tax revenues at the level of regional authorities (Rodina, 2020b; Lysenko, 2020).

In turn, self-sufficiency of territories decreases when there is not enough justification of the effectiveness of consolidation of expenditure powers and inter-transfer mechanisms of different levels of the budget with the strengthening of contradictions between the federal and local governments in the context of financial capacity deficit. Prolonged and systematic subsidies from the Federal Fund for Financial Support of the Constituent Entities of the Russian Federation hinder the development of alternative fiscal capacity options, the growth of the regions' own revenues, which in the current environment cannot be solved by administrative methods alone (Sugarova, 2019b). Subsidization is mistakenly regarded as a property of the budget itself, which comes close to the concept of financial insolvency (Latypova, Dalaev, Yarullin, 2014).

Reducing the «acuteness» of the gaps in subsidization of the Russian regions with the provision of a balanced level of social and economic development is one of the tasks of increasing competitiveness. At the same time, there should be some incentives to it. Thus, the potential for activation of financial resources to improve competitiveness in the regions with the predominance of profit tax in the structure of revenues is higher than in the subjects where the funds come mainly from retail trade and paid services.

However, with any, even the most perfect forms of inter-budget relations, they cannot solve the problem of sufficiency of regional financial resources without improving the overall state of the economy. Support from the federal center is designed to motivate regions to develop rather than breed dependency. Therefore, the tools of such support should be effective, and not only from the financial point of view, but also in terms of specific road maps, methodological recommendations focused on an individual approach to a particular business entity (Table 2).

As can be seen from Table 2, through 2005-2019, the North Caucasian Federal District had the lowest share of revenues and expenditures in the total volume across Russia, while the Central Federal District has the highest. Only two of all districts (North Western and Southern) reflected an upward trend in their contribution to total income. At the same time, revenues and expenditures of «rich» territories are more than 800% higher than those of «poor» territories. However, this gap does not look that excessive (in 2019, almost 200% higher), if the data per capita is used.

The key condition for the effective functioning of the system of inter-budget relations is, first of all, the balance of interests of all participants, which, according to Table 2, has been disrupted for a long time. Thus, during 2010-2018, despite changes in the methodologies (Accounts Chamber of the Russian Federation, 2020a), the list of subjects with low assessment of the quality of financial management was relatively constant, while more than half (54%) demonstrated high quality of regional financial management.

Table 2 – Dynamics of revenues and expenditures of the consolidated budgets of the Russian regions, trillion rubles

Years	Indicators		Federal districts								Total	Average
			Central	North Western	Southern	North Caucasian	Volga	Ural	Siberian	Far Eastern		
2005	revenue (R)	trillion	0.92	0.32	0.16	0.10	0.46	0.46	0.32	0.23	2.97	0.4
		%	30.98	10.77	5.39	3.37	15.49	15.49	10.77	7.74	100.0	12.5
	expenses (E)	trillion	0.91	0.31	0.16	0.10	0.45	0.40	0.33	0.25	2.91	0.4
		%	31.27	10.65	5.50	3.44	15.46	13.75	11.34	8.59	100.0	12.5
	R to E ratio		1.01	1.03	1.00	1.00	1.02	1.15	0.97	0.92	-	1.0

Years	Indicators		Federal districts								Total	Average
			Central	North Western	Southern	North Caucasian	Volga	Ural	Siberian	Far Eastern		
2010	revenue	trillion	2.10	0.76	0.42	0.27	1.01	0.72	0.71	0.55	6.54	0.8
		%	32.11	11.62	6.42	4.13	15.44	11.01	10.86	8.41	100.0	12.5
	expenses	trillion	2.09	0.78	0.44	0.28	1.08	0.70	0.70	0.56	6.63	0.8
		%	31.52	11.76	6.64	4.22	16.29	10.56	10.56	8.45	100.0	12.5
	R to E ratio		1.00	0.97	0.95	0.96	0.94	1.03	1.01	0.98	-	1.0
2015	revenue	trillion	3.09	1.02	0.69	0.36	1.37	0.97	0.91	0.90	9.31	1.2
		%	33.19	10.96	7.41	3.87	14.72	10.42	9.77	9.67	100.0	12.5
	expenses	trillion	2.99	1.04	0.74	0.38	1.45	0.98	0.98	0.92	9.48	1.2
		%	31.54	10.97	7.81	4.01	15.30	10.34	10.34	9.70	100.0	12.5
	R to E ratio		1.03	0.98	0.93	0.95	0.94	0.99	0.93	0.98	-	1.0
2019	revenue	trillion	4.61	1.54	1.06	0.51	1.88	1.40	1.36	1.21	13.57	1.7
		%	33.97	11.35	7.81	3.76	13.85	10.32	10.02	8.92	100.0	12.5
	expenses	trillion	4.74	1.52	1.03	0.50	1.86	1.36	1.35	1.21	13.57	1.7
		%	34.93	11.20	7.59	3.68	13.71	10.02	9.95	8.92	100.0	12.5
	R to E ratio		0.97	1.01	1.03	1.02	1.01	1.03	1.01	1.00	-	1.0
2019 to 2005	revenue	trillion	501.09	481.25	662.50	510.00	408.70	304.35	425.00	526.09	3818.98	477.4
		%	13.12	12.60	17.35	13.35	10.70	7.97	11.13	13.78	100.0	12.5
	expenses	trillion	520.88	490.32	643.75	500.00	413.33	340.00	409.09	484.00	3801.37	475.2
		%	13.70	12.90	16.93	13.15	10.87	8.94	10.76	12.73	100.0	12.5
	R to E ratio		0.96	0.98	1.03	1.02	0.99	0.90	1.04	1.09	-	1.0

Source composed and calculated by the authors

The analysis of normative-legal provision of inter-budget balancing (Budget Code of the Russian Federation, 1998) showed that the independence and self-sufficiency principles of the financial system of the regions are still violated. In doing so, the baseline is set at a standardized amount of expenditure covered by own revenues assigned on a permanent or negotiated basis. Obviously, the subsidization of territories has objectively emerged primarily due to the lack of effectiveness of the existing inter-budget relations, embedded in the methodology for assessing the macroeconomic environment, which requires a more substantiated study of the impact of functional structures of territories on their competitiveness. The causes of fiscal deficit, in terms of structural determinants, are macroeconomic, social, and spatial-resource factors. Macroeconomic ones exist due to the dynamics of global processes and relations of the state with economic entities, which is manifested in the resource-oriented nature of the Russian economy and dependence on the volatility of financial markets.

Due to multiplier effects, government competitiveness is aimed at building up and maintaining aggregate demand during the crisis, which without an increase in inflation is only possible based on the balanced optimization of budgets at all levels. Accordingly, inflation remains an important factor not only in budget expenditures, but also for the revenue base, as tax rates, both indirect and direct, directly affect pricing.

Social reasons for the growth of subsidization are primarily due to the uneven structure of the economically active population in the regions. On the other hand — indicators that determine the quality of life of the population, when the state ensures optimal distribution of subsidy funds, and the funds of the regions act as an effective mechanism of budgetary equalization.

Spatial-resource factors include natural social and economic and natural-technological heterogeneity of Russia as the largest (by territory) state. The different economic and geographic location sets the initial conditions for regional and municipal authorities.

It is important to take into account that any recommendations to improve the efficiency of inter-budget relations should be correlated with the main directions of the state budget policy in the medium and long term through promoting the balance of regional and municipal budgets and optimizing the adopted forms of inter-budget transfers (Sugarova, 2019c), which include subsidies, subventions, and other inter-budget transfers. The differentiation of regions by the amount of funds allocated to municipalities (from a few thousand rubles in the Omsk and Orel oblasts to one billion rubles in the Republic of Tatarstan and the Moscow oblast), as well as by the number of municipal entities - recipients of these funds (from one in the Marii El and Ingushetia Republic to an unmatched number in the Samara oblast) is also notable (RF Accounts Chamber, 2020b).

Mechanisms of granting subsidies through tenders, comprehensive evaluation, ranking by indicators, etc., vary considerably by regions. It is not acceptable to use the coefficient of «comparability of conditions» in calculations of competitive advantages. The absence of a unified methodological approach may form the prerequisites for biased management decisions.

In recent years, the federal government has taken active measures to increase the financial independence of the regions. However, the increase of the number of regions that are not recipients of subsidies through fiscal capacity equalization has not yet been achieved, although it was planned and approved in the state program «Development of federal relations and creation of conditions for effective and responsible management of regional and municipal finances» as a target indicator.

Conclusion

As a result of the conducted research, it was established that the social and economic essence and nature of competitiveness are conditioned by inseparable unity of this indicator of advantages of a certain economic system with its factor influence on the processes of each hierarchical level of national economy management. The proposed treatment allows a comprehensive territorially and dynamically scaled theoretical and applied approach to the methodology of fundamental substantiation of the origin and development of competitiveness as a result of the market economy in the interrelation and dependence on the objective economic laws of supply and demand, on the one hand, and on the other hand, using empirical calculation data to discover new, more efficient directions of future strategic development of the country.

The analysis of the role and degree of influence of financial resources was used to substantiate a new methodological approach to the development of the budget process management model in the economic interaction between the state and local (regional) territories, which contributes to improving the social and economic effect of all economic entities by equitable and optimal alignment of subsidies from the federal budget, strengthening the resource potential of regions.

At the same time, the main tasks for further progressive development of all economic systems from economic entities to the region and the country will be solved, ensuring the fulfillment of urgent social obligations to the population to increase incomes and improve quality of life based on high competitiveness of economic entities of all levels of government.

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SANCTIONS WARS AS A TOOL OF GLOBAL COMPETITION AND THEIR REFLECTION IN SCIENTIFIC RESEARCH AND QUERIES (THE CASE OF RUSSIA AND IRAN)

Oleg V. Zolotarev

Russian New University, Russia
E-mail: ol-zolot@yandex.ru

Aida K. Khakimova

Russian New University, Russia
E-mail: aida_khatif@mail.ru

Seyed K. Tayebi

University of Isfahan, Iran
E-mail: sk.tayebi@ase.ui.ac.ir

Olesya E. Ryazanova

Moscow State Institute of International Relations of the Ministry of Foreign Affairs of Russia, Russia
E-mail: afinna2011@yandex.ru

Vera P. Zolotareva

Moscow Polytechnic University, Russia
E-mail: zolotareva2005@mail.ru

Abstract. The paper is based on the study of modern sanctions wars as a tool of global competition and attempts to justify the relevance of this scientific issue using bibliometric analysis. The paper uses the Dimensions database for the analysis. The paper examines the dynamics of query popularity according to Google Trends. As part of the study, the authors created a visualization of scientific networks that study the economic sanctions enacted against Iran. The results of the analysis of scientific publications and queries about the economic sanctions against Russia and Iran have shown that they depend on the timing of the introduction of sanctions measures and their transformation.

Keywords: global competition, sanctions wars, world economic system, Russia, Iran, bibliometric analysis, scientific publications.

JEL codes: F42, F49, H77

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Introduction

The modern world economic system is largely transformed due to the increasing influence of global competition. The existing relationship between the level of economic development of individual countries and global competition makes it an effective tool for positioning national economies in the global economic space. In addition, global competition is not eliminating but enhancing barriers to national competitiveness for many countries, including Russia and Iran. Numerous works of Russian researchers are dedicated to analysis of this problem [Bocharnikov, Ovsyannikova (2020), Gadjimuradov, Gadirova (2019), Gaidarenko (2020), Gaman-Golutvina, Smorgunov, Timofeeva (2019), Getmanets, Tereschenko (2019), Milovidov, Askerzade (2020), Ovchinnikov (2011), Okunev (2019), and others] .

One of its key tools in recent decades has been the sanctions wars, which have also affected countries such as Russia and Iran. The ana¬lysis of common approaches to their research in the theory and practice of international relations showed how many aspects and how large this problem is, as well as the duality of how sanctions are imposed to achieve geo¬strategic objectives [Arkhipova (2018), Afontsev (2020), Gurvich, Prilepsky (2016), Zagashvili (2016), Milovidov, Asker-zade (2020), Mitina, Momeni (2020), Nureev (Ed.) (2017), Nureev (Ed.) (2021), Tashtamirov (2018), Telegina, Halova (2019), Fituni (2019), Attia, Crauvogel, von Soest (2020), Bovle (2019), Early, Schulzke (2019), etc.].

The purpose of this paper is to investigate the relevance of the problem of sanctions wars using bibliometric analysis using Russia and Iran as an example. In order to achieve the goal, we have identified the dynamics of publication activity on this issue. Google Trends were used to analyze the dynamics of the query popularity. In addition, we have used the visualization tools such as VOSviewer, which can download and export information from many sources.

Sources and methods

In addition to empirical, experimental, and theoretical research, we used methods of computational linguistics to solve the problem.

The Dimensions.ai information system was used for this analysis, as it covers a large number of documents and allows easy uploading and analysis of datasets. It also includes more than 90 million publications and over 4 billion references. Moreover, it offers a complete API for querying using its own query language, DSL (Domain Specific Language). The included tools can be divided into three categories: general bibliometric analysis of publications, analysis of queries, analysis of statistical data.

This paper applied the following search terms: «economic sanctions Iran», «economic sanctions Russia», and «economic sanctions Iran+Russia». This data comes from Dimensions.ai provided by Digital Science (https://www.dimensions.ai).

Results and discussion

A study of the total number of publications reflected in Fig. 1 shows an increased interest in the sanctions wars against Iran and Russia which had started in 2000. Note, however, that the shape of the dependencies is repetitive. Google Trends query dynamics show a sharp increase in queries in 2014. This happened due to the introduction of the «third round» of sanctions against Russia by the US and the EU in 2014. That round severely limited the opportunities for companies in several sectors of the economy at once. Another reason was the interim agreement to suspend Iran's nuclear program, which came into force on January 20, 2014. At that time, the US loosened sanctions on Iranian oil exports, suspending a number of other restrictions as well.

For Western countries, Iran has become an example of «successful sanctions,» where regular imposition of tiered restrictions brings the country back to the negotiating table. After the first sanctions lists against Russia, many experts were skeptical about repeating the «Iranian scenario». In 2014, analysts studied the success criteria of sanctions, noting that the probability of creating similar conditions for Russia is extremely low [Makarenko, (2014)].

The dynamics of publications related to the requests for sanctions against Russia and Iran is shown in Table 1.

Table 1 - Number of publications by year (Russia, Iran, Iran + Russia)

Year	Publications		
	Russia	Iran	Iran + Russia
2000	2000	500	600
2007	5000	3000	2000
2008	4000	3000	1800
2009	6000	3000	2000
2010	6000	3000	2000

Year	Publications		
	Russia	Iran	Iran + Russia
2011	8000	4500	3000
2012	10000	7000	4000
2013	15000	9000	7500
2014	7000	4000	3000
2015	10000	5500	4000
2016	9500	5000	3000
2017	9000	5500	4000
2018	9000	5000	3500

Source: composed by the authors

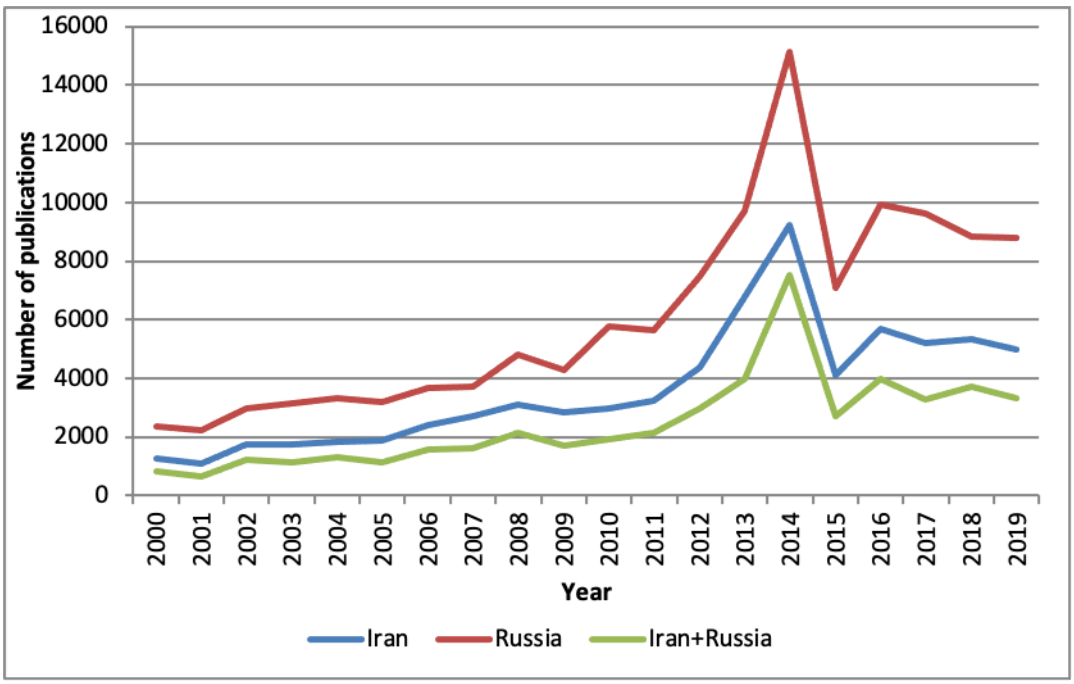

Figure 1. Number of papers published by year during the 2000-2019 period
Source: composed by the authors

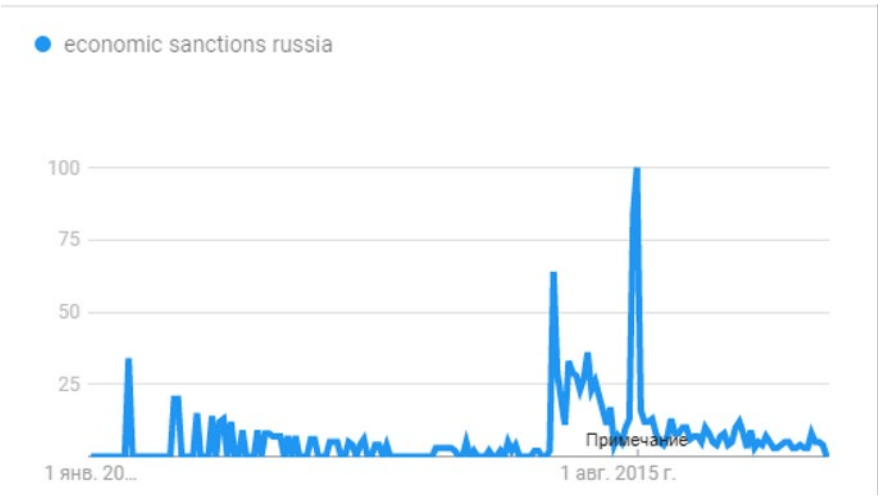

Figure 2. Trends in the popularity of economic sanctions Russia for Google Trends
Source: composed by the authors

The graphs (Fig. 1) are similar because of a comparative analysis of Russian and Iranian sanctions

scenarios.

Popularity dynamics of «economic sanctions Russia» on Google Trends (Fig. 2) shows a sharp increase in queries between March 2014 and January 2016. All of these requests came from the US.

Particular interest was generated by a new economic «turn» in the global energy sector, and key alliances involving Russian business. However, the sectional moves directed at Russia have diversified the costs of big business. Thus, it created incentives to strengthen positions and international agreements with Eastern partners.

Popularity dynamics of «economic sanctions Iran» on Google Trends (Fig. 3) shows a rather sustained interest in the topic. Moreover, as in the case of the sanctions against Russia, all of these requests originated in the United States.

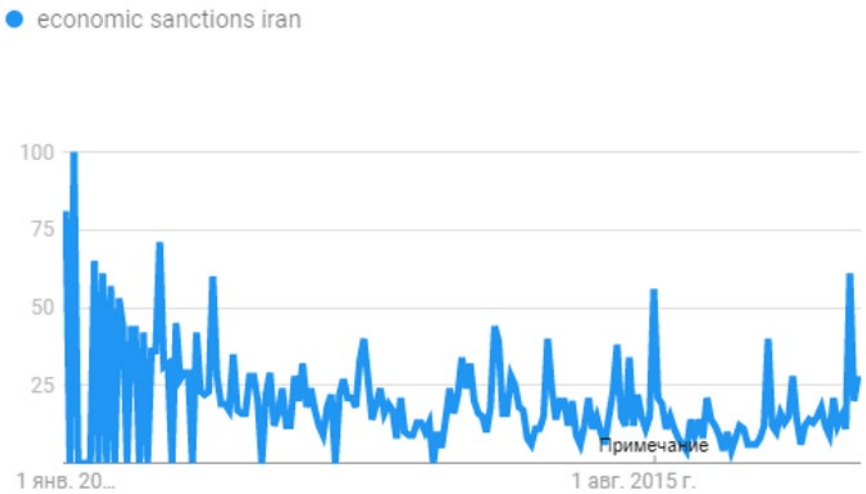

Figure 3. Trends in the popularity of economic sanctions Iran for Google Trends
Source: composed by the authors

Thus, the dynamics of inquiries reflect the relationship between the timing of the introduction of sanctions measures and their transformation.

To visualize the research networks that study economic sanctions against Iran, we considered the co-authorship network by country, authors with at least 5 publications. Of the 3,151 authors from 68 countries, 28 countries are linked in seven clusters (Fig. 4). The two largest clusters included 7 countries each. The first cluster included countries: Canada, France, Italy, Malaysia, Norway, Pakistan, Turkey. The second cluster included countries: Australia, Egypt, Iraq, Japan, Jordan, Poland, UK. Cluster 3 — China, Germany, Netherlands, Russia, Singapore. Cluster 4 — Belgium, Iran, Switzerland. Cluster 5 — South Africa, Sweden. Cluster 6 — India, South Korea. Cluster 7 — USA, Israel.

In addition, we examined the co-authorship network by organization (Fig. 5). 657 organizations had at least 5 publications; 35 of the related organizations were categorized in 8 clusters. Figure 5 shows that there is interaction between only a small number of universities.

The largest cluster included 7 universities and organizations: Harvard University (USA), Isfahan University of Medical Sciences (Iran), London School of Hygiene & Tropical Medicine (UK), Mcmaster University (Canada), Shiraz University (Iran), Shiraz University of Medical Sciences (Iran), UNSW Sydney (Australia).

Cluster 2 — Alexandria University (Egypt), Columbia University (USA), Johns Hopkins University (USA), Michigan State University (USA), Ministry of Health (USA).

Cluster 3 — Philipp University of Marburg (Germany), Shahid Beheshti University of Medical Sciences (Iran), Tarbiat Modares University (Iran), University of Hamburg (Germany), University of Oxford (UK).

Cluster 4 — Hamedan University of Medical Sciences (Iran), Kerman University of Medical Sciences (Iran), Lund University (Sweden), University of Tehran (Iran).

Cluster 5 — Arizona State University (USA), Imperial College London (UK), Sharif University of

Technology (Iran), Tabriz University of Medical Sciences (Iran).

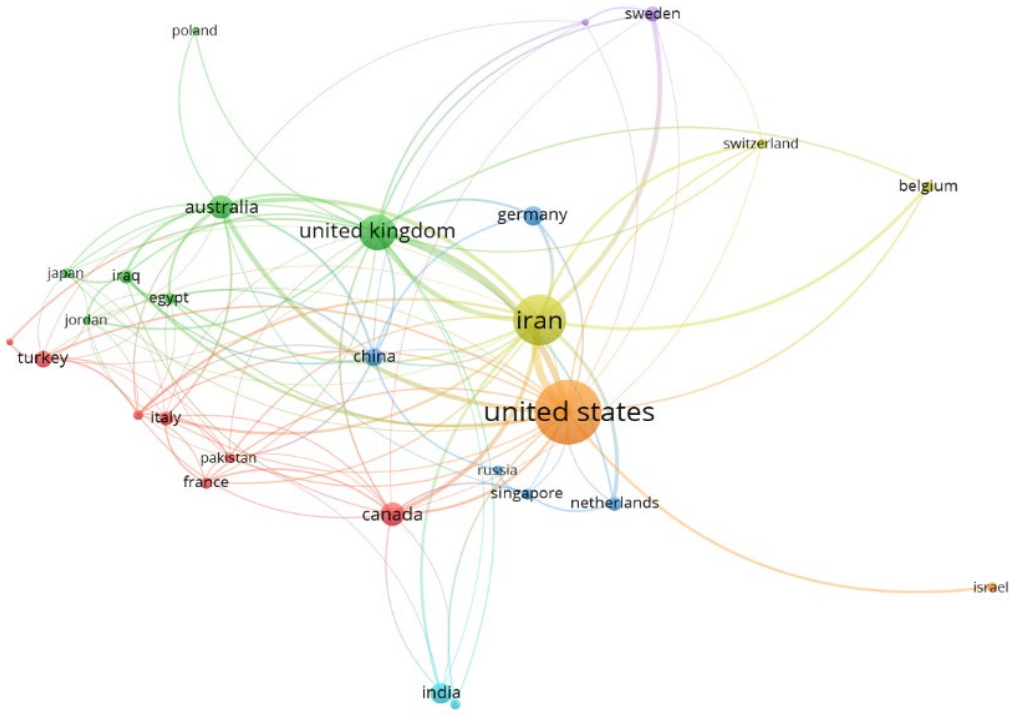

Figure 4. Visualization of a country co-authorship network on publications on economic sanctions against Iran

Source: composed by the authors

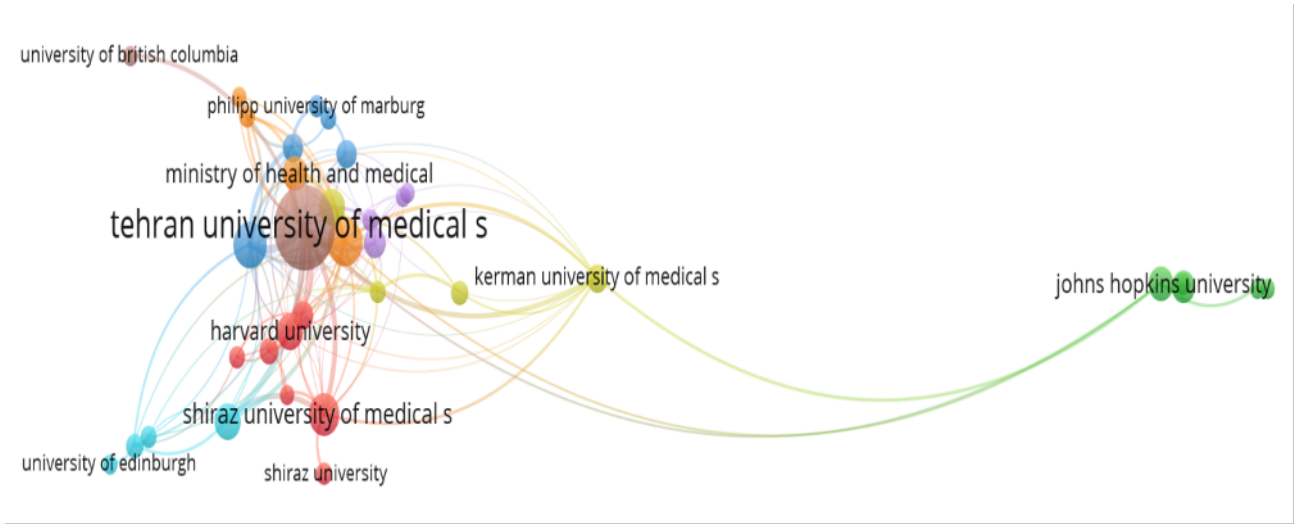

Figure 5. Visualization of a network of co-sponsoring publications on economic sanctions against Iran

Source: composed by the authors

Cluster 6 — Baqiyatallah University of Medical Sciences (Iran), Erasmus University Rotterdam (the Netherlands), Mashhad University of Medical Sciences (Iran), University of Edinburgh (Scotland).

Cluster 7 — Iran University of Medical Sciences (Iran), Ministry of Health and Medical Education (Iran), «University of California, Los Angeles» (USA), University of Social Welfare and Rehabilitation Sciences (Iran).

Cluster 8 — Tehran University of Medical Sciences (Iran), University of British Columbia (Canada).

We constructed a citation network by source (Fig. 6). 798 sources had at least 5 source papers; 89 of the related sources were categorized in 55 clusters. Only 9 clusters included more than 2 journals. The cluster with the most pronounced weight is No. 7. It includes three journals: International Business And Management, Middle East Policy, The Muslim World. The most cited journal is Middle East Policy, Weight<Citations> = 357.

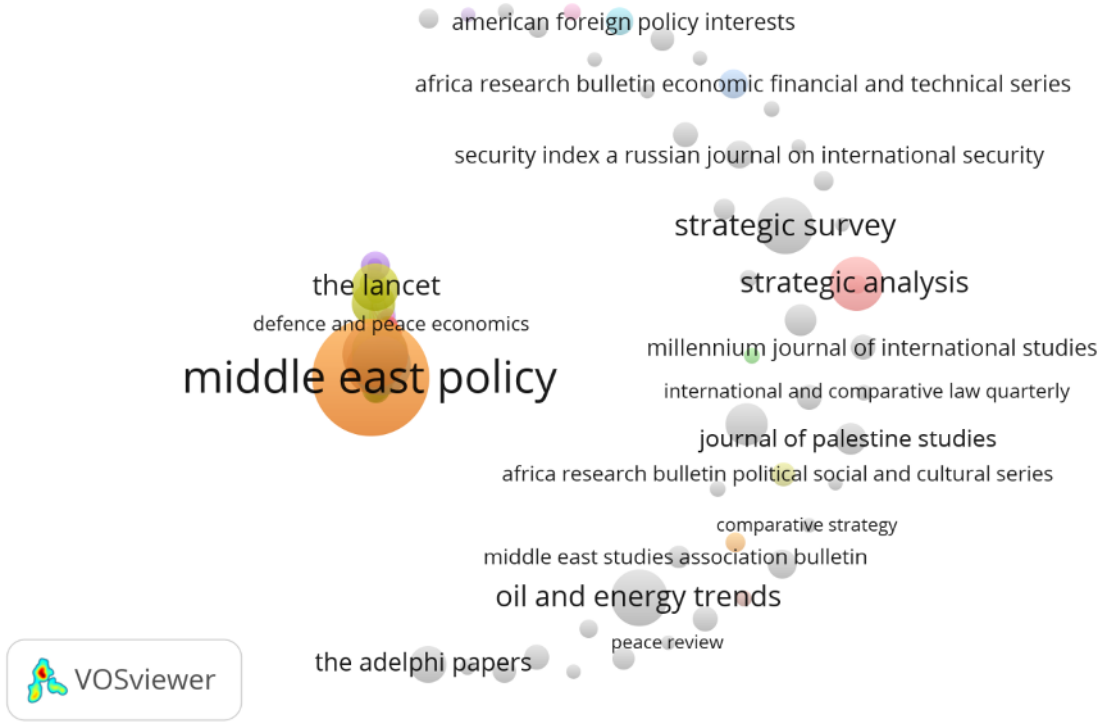

Figure 6. Visualization of a citation network based on publications on economic sanctions against Iran
Source: composed by the authors

Another pronounced cluster in No. 6, which includes journals: BMC Public Health, Iranian Studies, Medicine Conflict & Survival, Plos One, The Lancet, World Economy. The most prominent of these are The Lancet, Iranian Studies.

We also constructed a citation network by country (Fig. 7). 68 countries had at least 5 paper sources, 28 of the related sources were categorized into 8 clusters, 7 of which included at least 2 countries.

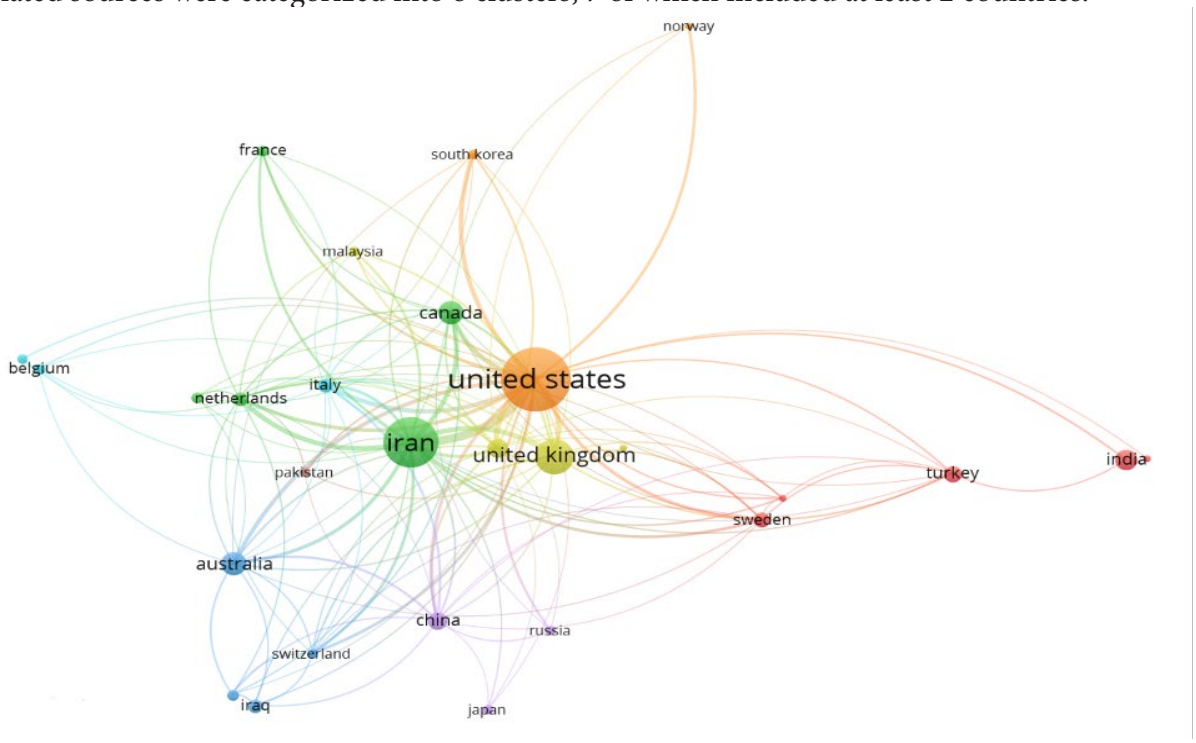

Figure 7. Visualization of the citation network by country of publications on economic sanctions against Iran

Source: composed by the authors

The most cited countries are the USA (the cluster also includes South Korea and Norway), Iran (the cluster also includes Canada, France, the Netherlands, Singapore), the UK (the cluster also includes Germany, Malaysia, Poland). Russia is in the same cluster as China and Japan.

Conclusion

Global competition has increased the arsenal of leverage in the global economy. One of the most important tools has been the sanctions wars waged by the United States and the European Union against other countries, particularly Russia and Iran.

The result of the bibliometric analysis and analysis of queries was a confirmation of the scientific hypothesis about the relevance of the problem in the context of global competition.

The visualization of the obtained information reflected the progressive interest of researchers in different aspects of the topic and its dependence on the analyzed time interval.

The graphs built in the VOSviewer system show the results of the study of economic publications on the growing interest of leading journals in the topic of sanctions against Iran.

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REGIONAL COMPETITIVENESS AND REGIONAL MANAGEMENT EFFICIENCY

Alla B. Berendeeva

Ivanovo State University, Russia
E-mail: abab60@mail.ru

Anna A. Elizarova

Ivanovo Fire Rescue Academy, Russia
E-mail: ms.anna226@mail.ru

Abstract. The paper presents the analysis of approaches to assessing the efficiency of public administration. The paper provides a comparison of methodological approaches to evaluating the efficiency of executive power bodies and senior officials of Russian regions. The authors review the indicators that determine the efficiency of regional management in the most popular ratings of economic development and implementation of the territories' potential.

Keywords: public administration efficiency, activity of executive authorities of Russian regions, activity of senior officials of Russian regions, ratings of regions, performance indicator of management of regions.

JEL codes: C82, M10, O18, R50, R58

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Introduction

Numerous studies show that the social and economic situation of regions is influenced by a variety of internal and external factors. Therefore, it is important to assess the results of socio-economic development of territories comprehensively. Currently, the researchers and practitioners are trying to invent novel methods of development of territorial management. The Federal State Statistics Service (Rosstat) uses both partial and integral indicators in its comprehensive assessment of social and economic development. In turn, Rosstat data are widely used for ranking Russian regions (they study the specifics of investment, innovation, standard of living, quality of life, development of competition, etc.)

In recent years, Rosstat has been expanding the list of private indicators of economic efficiency, which include: productivity index; share of high-tech and knowledge-intensive industries in GDP, GRP; the share of investment in fixed capital in GDP, GRP; highly productive jobs increase; highly productive jobs increase broken down by type of economic activity in different Russian regions; share of domestic R&D expenditure in GDP and GRP; energy intensity of GDP (GRP), etc.

This area of research is promising because, as noted by T. Popova, there is work alienation in public and municipal service (Popova, 2016). Also, M. Firsov argues that qualification requirements for, for example, heads of regions in the Federal Public Civil Service vacancies register do not correspond to the scale and complexity of tasks faced by regional bodies (Firsov, 2019).

In Article 4 of the Russian Federal Law "On the State Civil Service in the Russian Federation" the efficiency criteria are based on the principles of public administration in civil service: priority of human and civil rights and freedoms, unity of legal and organizational foundations of federal and regional civil service, professionalism and competence of civil servants, stability of civil service, interaction with public associations and citizens, etc. (Federal Law No. 79-FZ, July 27, 2004)

Currently, Russian management is forming an approach to the comprehension of public administration efficiency while an administrative reform is being implemented. These problems are researched by G. Borschevsky, Yu. Gimazova, N. Glazunova, E. Dobrolyubova, A. Nagimova, I. Nikolaev and M. Titova, L. Pugacheva, T. Diagileva and many others (Berendeeva, 2016).

The scientific literature uses other concepts along with the concept of "efficiency" when assessing public administration: "quality" and "effectiveness". N. Glazunova draws attention to the specifics of the public administration system in comparison with the business sector, highlights such limitations in the implementation of efficiency indicators when assessing the public sector as the problem of standardization of public services, the monopoly of public institutions on certain goods and services, etc. (Glazunova, 2006)

As noted by researchers, the main criterion of social efficiency of public administration is to improve the quality and standard of living of society. A. Maidyrova proposes the model Goal-Result-Interests to assess efficiency (Maidyrova, 2015).

Yu. Knyazev and V. Zotov consider the efficiency of public authorities as a generalized and interrelated series of concepts such as cost-effectiveness, qualimetricity, and results. In this case, the efficiency of public administration is assessed through the achievement of objectives while minimizing costs (cost-effectiveness) and compliance with applicable standards and regulations on the quality of work and services (qualimetricity). Assessment of public administration efficiency involves the comparison of actual and planned indicators of the implementation of plans, programs, and projects (effectiveness). We can agree that the main subject of assessing the activities of public authorities is the social effect, which is associated with the improvement of the quality of life and creation of favorable conditions for the population of a particular territory (Knyazev, 2019).

A. Nagimova proposes to use the indicator of the overall social effect of public administration, which is the creation of favorable conditions for life in a region or state, as well as the quality of life of the population (Nagimova, 2015).

As types of public administration efficiency, L. Pugacheva, T. Diagileva distinguish economic efficiency, social efficiency, environmental efficiency, foreign economic efficiency, target or goal-setting efficiency, executive efficiency (Pugacheva, 2015).

The analysis of the efficiency of institutions in the activities of public authorities and administration is presented in the state program "Improvement of public administration and local self-government institutions in the Ivanovo Oblast" (Resolution of the Government of the Ivanovo region No. 454-p, November 13, 2013).

A. Tebekin examines the triad "goal-measurability-practical implementation" of the managed social and economic system, such categories as goal-setting, survival, effectiveness, efficiency, productivity, practical feasibility, and he notes a significant discrepancy between the formulated target indicators and indicators of expected results of Russian state programs (Tebekin, 2020).

Many authors see the idea of efficiency as goal-setting. V.M. Bondarenko proposes an interesting novel paradigm. The author considers all problems of Russia's and the world's development from the standpoint of determining a single goal-setting, and the single criterion of efficiency which characterizes the whole process of development is the satisfaction of the needs of each individual to become a better person. As a result, the author proposes to develop and implement the Megaproject "Operating development territory: all for human" (Bondarenko, 2020).

Purpose of the study

In improving the efficiency of regional economic performance, assessments of public administration efficiency and the choice of the most effective and efficient methodology play an important role. This is necessary when the theoretical and methodological bases and methodological approaches are poorly developed.

Study methodology

The research is based on a comparison of, firstly, methodological approaches to assessing the efficiency of executive authorities and top officials of Russian regions, secondly, assessments of management efficiency in the most popular ratings of economic development and implementation of territorial potentials.

Study contents

The efficiency of government bodies and administration in the Russian regions and local governments (governors, heads of municipalities) is being assessed more extensively nowadays.

We analyzed the methodological approaches to assessing the efficiency of regional state authorities and administration, as well as Russian governors. We analyzed the indicators of three methodologies reflected in the decrees of the President of the Russian Federation (2017, 2019, 2021).

Table 1 - Comparison of efficiency assessment indicators of executive authorities and top officials of Russian regions

Efficiency Assessment Indicators of the Executive Authorities of the Constituent Entities of the Russian Federation, 2017	Efficiency indicators for senior officials	
	2019	2021
Trust in authorities [1)]		
Public assessment of the performance of local executive authorities in Russia	Level of trust in authorities	Trust in authorities
Public assessment of the efficiency of local executive authorities in Russia		
Demographics		
Life expectancy at birth	Life expectancy at birth	Population of the Russian region
Total birth rate	Natural population growth	Life expectancy at birth
Labor, employment, migration		
Unemployment rate	Number of high-productivity jobs in the extra-budgetary sector of the economy	
Migration growth rate (per 10,000 persons)	Labor productivity in basic non-resource sectors of the economy	
Employment in SMEs		
Ratio of average number of employees of SMEs to the population	Number of employees in small business, including sole proprietors	Number of people employed in SMEs, including sole proprietors and self-employed
Personal income		
Dynamics of real average monthly salary	Level of real average monthly salary	Growth rate (growth index) of real average monthly salary
The ratio of the average per capita income of the population minus the mandatory payments and payments for housing and utilities to the cost of a fixed set of basic consumer goods and services		Growth rate (growth index) of real average per capita income
Population poverty rate		
Share of population with income below the minimum wage established in the Russian region	Poverty rate	Poverty rate
Housing and utilities services		
Housing affordability ratio [2)]	Level of housing affordability	Housing quantity

Efficiency Assessment Indicators of the Executive Authorities of the Constituent Entities of the Russian Federation, 2017	Efficiency indicators for senior officials	
	2019	2021
Quality and accessibility of housing and utilities services[3)]	Number of families that improved their housing conditions	Number of families that improved their housing conditions
Culture. Spiritual development Healthy lifestyle		
Public assessment of conditions for self-actualization, including children's self-actualization		Proportion of people systematically engaged in physical education and sports
		Efficiency of the system for identifying, supporting, and developing the abilities and talents of children and young people
		Conditions for fostering a harmoniously developed and socially responsible personality
		Number of visits to cultural events
		Share of citizens engaged in volunteer activities
Social services Social sector Social infrastructure		
Assessment of public satisfaction with services in education, health, culture, and social services	Education level	Education level
Results of an independent assessment of the quality of service provision by public service organizations		
Ecology		
	Ratio of cities with a supportive environment	Quality of the urban environment
	Environmental quality	Environmental quality
Public safety Crime. Shadow economy		
Crime rate		
Percentage of residents of a Russian region who have encountered corrupt practices		
Investments		
Dynamics of gross regional product per capita	Investments in fixed assets, excluding federal projects of infrastructure monopolies	Growth rate (growth index) of physical volume of investment in fixed capital [4)]
Investment in fixed capital per capita		

Efficiency Assessment Indicators of the Executive Authorities of the Constituent Entities of the Russian Federation, 2017	Efficiency indicators for senior officials	
	2019	2021
Integral index of a Russian region in the national rating of the investment climate among Russian regions		
Road infrastructure		
Density of the public road network that meets the regulatory requirements for transport and operational performance	Proportion of regional and urban roads that meet regulatory requirements, taking into account traffic congestion	Proportion of road network in major city regions that comply with regulations
Financial indicators of the regional economy		
Volume of tax revenues of the consolidated budget of a Russian region per capita, adjusted for the index of budget expenses		
The ratio of a Russian region's public debt as of January 1 of the year following the reporting one to the total annual budget revenues of the Russian region		
Share of overdue accounts payable in the expenditures of the consolidated budget of a Russian region		
Digital economy development		
		Digital maturity of public authorities of Russian regions, local authorities, and organizations [5)]

1) Trust in authority: Trust in the President of Russia, senior officials (heads of the highest executive bodies of the government) Russian regions, the level of which is determined, inter alia, through the assessment of public opinion in relation to the achievement of national development goals in the Russian regions

2) Housing Affordability Ratio — the number of years it takes a family of three to purchase a standard-sized apartment of 54 square meters taking into account the average annual aggregate family income

3) Quality and availability of housing and utilities (number of days with disruption of water, heat, and electricity supply on average per resident; the ratio of the average per capita expenditures of the population to pay for housing and utilities to the cost of a fixed set of basic consumer goods and services; share of utilized solid municipal waste in the total volume of solid municipal waste; share of treated wastewater in the total volume of wastewater)

4) Growth rate (growth index) of the physical volume of investments in fixed assets, excluding investments of infrastructure monopolies (federal projects) and budgetary allocations from the federal budget

5) Digital maturity of public authorities of Russian regions, local authorities, and organizations in healthcare, education, urban economy and construction, public transport, which implies their use of Russian information and technological solutions

Source: composed by the authors

As Table 1 shows, social assessments and surveys of the population are increasingly important in the efficiency assessment ratings of local executive authorities (2017) and top officials (2019, 2021). Methodology-2021, which is based on the surveys used to calculate the indicators "the level of trust in authorities" (2017, 2019, 2021), "conditions for self-realization" (2017), "public satisfaction with services in

education, health, culture, social services" (2017), is currently under development.

Researchers propose an additional indicator "subjective quality of life", calculated based on surveys of the population, assessing the state of psychological well-being (Poduzov, 2017).

The role of social indicators is increasing as dramatic changes in social development take place. As D.W. Ivanov writes, the fullness increases through spatial social and cultural mobility and creativity, connecting high standards and quality of life with inclusion in the networks and flows of a new post-industrial society. An innovative model of social development is developing in large cities, when "indicators of income/consumption level, availability of social services and comfort of the environment are supplemented by indicators of the saturation of people's lives with activity in new communication networks, development of new public spaces, artistic or technical creativity" (Ivanov, 2021). Also, there is a new form of inequality — differentiation of social groups by virtual capital; new indicators are introduced — involvement, activity, creativity in network communications (Asochakov and Yu, 2021).

Integrated methodologies make it possible to start using integral indicators and compile rankings. Sociological evaluations are also widely used in creating a system of various rankings. We have analyzed the most popular economic ratings of Russian regions (investment attractiveness, investment climate, conditions for doing business) (see Table 2.)

All surveys use three types of assessments: statistical indicators, surveys of the business community, and expert assessments. For example, the rating of regions by innovation uses expert opinions when determining the quality of the institutional environment and the level of social and political stability. Expert opinions are relevant in determining the significance of individual factors in the final assessment of investment attractiveness.

Table 2 — The most popular assessments of economic development and implementation of territorial potentials

	Rating methodology (parameters, indicators)	Efficiency assessment indicators for administration management
1. Rating of investment attractiveness of regions (Rating Agency Expert (RAEX)	Investment attractiveness is assessed according to 2 parameters: investment potential and investment risk. The investment potential of a region consists of 9 particular potentials (8 until 2005), each of which, in turn, is determined by a whole group of indicators. The investment risk of a region consists of 6 particular risks, each of which, similarly to particular potentials, is determined by a whole group of indicators. There are 13 rating categories according to the "investment risk - investment potential" ratio	The 6 types of regional investment risk include management risk
2. Rating of investment attractiveness of Russian regions (National Rating Agency — NRA)	Investment attractiveness of a region consists of 7 factors, which are assessed using a set of 54 indicators (proxy variables). The methodology now includes 2 new indicators: expert assessment of the level of development of public-private partnership in the regions and consumer price index in the region.	Institutional environment and social and political stability: expert assessment of the efficiency of the regional legislation that regulates the interaction between the authorities and investors, expert assessment of the favorability of the regional tax legislation (availability of tax benefits and the possibility of obtaining them), the level of social and criminal tension in the region.

	Rating methodology (parameters, indicators)	Efficiency assessment indicators for administration management
3. National rating of investment climate in Russian regions (Agency for Strategic Initiatives - ASI)	There are 44 indicators and 4 assessment areas: regulatory environment (6 factors); institutions for business (4 factors); availability of resources and quality of infrastructure for business (4 factors); support for small and medium-sized enterprises (4 factors). Each factor within one direction includes an average of 3 assessed indicators. In addition to the described factors, 20 indicators outside the rating are also added to the assessment. At the last stage, the indicators are summarized in the integral index of investment attractiveness	The regulatory environment is assessed by public service delivery quality factors — efficiency indicators of various public services for business: time spent, number of procedures, and satisfaction of entrepreneurs with typical administrative procedures (for example, registration of legal entities, issue of construction permits, issue of licenses, registration of ownership of real estate, power grid connection).
The efficiency of institutions for business is assessed by the following factors: availability and quality of legislation protecting investor rights, investment support mechanisms, assessment of the level of corruption and development of PPP mechanisms		
4. Rating of innovation development of the Russian regions (Institute of Statistical Studies and Economy Knowledge — ISSEK — Higher School of Economics, as part of the Russian Cluster Observatory activity)	53 indicators are used in the assessment, the calculation includes the integral index of innovation development of regions and sub-indices: social and economic conditions of regional innovation, state innovation, exports, quality of innovation policy, scientific and technical potential of the regions	The Innovation Policy Quality Index (IPQI) is calculated using the following indicators:
- involvement of regions in science, technology, and innovation policy at the federal level,		
- sophistication of normative legal regulation of innovation,		

	Rating methodology (parameters, indicators)	Efficiency assessment indicators for administration management
- availability of specialized coordinating bodies and development institutions engaged in innovation, etc.		
5. Efficiency rating of the heads of federal executive authorities which create favorable conditions for entrepreneurship	The methodology includes 59 efficiency assessment indicators for heads of federal executive authorities and 23 efficiency assessment indicators for top officials (heads of top executive bodies of the government) of Russian regions to create favorable conditions for entrepreneurship	- Assessment by the business community of the general conditions for doing business in a Russian region - Number of implemented key provisions of the standard of executive authorities of a Russian region to ensure a favorable investment climate in the region - Assessment by the business community of the implementation efficiency of activity elements of the executive authorities of a Russian region to ensure a favorable investment climate in the region - Level of development of public-private partnership of a Russian region - Evaluation by the business community of the effectiveness of the SME support program in the Russian region - The maximum number of procedures required to obtain a construction permit for a reference capital / residential non-production building - The deadline for completing all procedures required to obtain a permit for the construction of a reference facility for capital / residential non-production building - Share of populated areas in a Russian region with approved documents of territorial planning and urban zoning in the total number of populated areas

	Rating methodology (parameters, indicators)	Efficiency assessment indicators for administration management
		- The maximum number of steps required for technological connection, etc.
6. Methodology for comprehensive assessment of the social and economic development of Russian regions*	The methodology includes 22 indicators: GDP per capita; the volume of investment in fixed capital per capita; the volume of foreign trade turnover per capita; financial security of the region per capita; the ratio of average per capita income to the minimum wage; the share of the population with income below the minimum wage (percent) in the total population; total turnover of retail trade, public catering, and paid services per capita; composite indicator of the level of development of social infrastructure sectors, etc.	missing

* Used as part of the Federal Target Program: Reducing disparities in the social and economic development of Russian regions (for 2002-2010 and up to 2015).
Source: composed by the authors

Expert RA rating agency uses management risk (level of management in the region) — it is assessed based on three main criteria: the quality of regional budget management, including:

- quality of budget planning, quality of budget execution, financial relations with populated areas, quality of state property management, and transparency of budgeting;
- ability of the regional government to attract a sufficient amount of investment for further economic development (the ratio of direct investment to GRP);
- ability of the regional authorities to provide the population with the minimum level of necessary social services through a proxy indicator of infant mortality rate in the region.

Additionally, the following stressors are also considered: availability of serious news about corruption cases against representatives of the regional executive authorities and removal of the governor due to "loss of confidence".

The NRA rating of investment attractiveness of Russian regions focuses on the characteristics of the institutional environment and social and political stability. A large set of indicators is used in the methodology of the National rating of the investment climate in the Russian regions of the ASI (2 groups of indicators — assessment of the regulatory environment and efficiency of institutions for business) and the methodology of the analysis of favorable conditions for business activities (more than 10 indicators).

Conclusions

In Russia, ratings are popular in assessing the level and dynamics of social and economic development of Russian regions (investment attractiveness, risk, capacity and climate, innovation, the activities of executive authorities and senior officials of Russian regions).

Our analysis shows that, firstly, sociological and expert assessments are increasingly important in these ratings of the Russian regions, while Rosstat indicators play a lesser role, and secondly, the search for new indicators that allow more objective analysis and assessment of processes and phenomena in the regional economy is underway. Thus, Rosstat has developed indicators of economic efficiency in addition to the existing indicators of social and economic development of the Russian regions. The Agency for Strategic Initiatives collects data on 31 additional indicators for indicators not included in the Rating when calculating the national

rating of the investment climate in the Russian regions for further development of the methodology and the use of best regional practices outside the Rating.

The analysis of 3 methodologies for assessing the effectiveness of executive power bodies and top officials of the Russian regions shows that the list of indicators does not include financial and security indicators and introduces regional digital environment indicators, as well as indicators that represent the lifestyle of the region's residents. Important social and environmental indicators are still in use.

The analysis of 6 methodologies of ratings of the state of economic development and implementation of territorial potential shows that assessments of managerial efficiency are most developed in the effectiveness rating of managers of federal executive authorities in creating favorable conditions for business activities, the Expert RA Rating of investment attractiveness of regions and the ASI National rating of the investment climate in the Russian regions. The NRA Rating of investment attractiveness of Russian regions and the HSE ISSEK Rating of innovative development of Russian regions are less developed. The methodology for the comprehensive assessment of the level of social and economic development of the Russian regions does not assess the efficiency of administration management.

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COMPETITIVENESS OF RUSSIAN REGIONS IN FOREIGN ECONOMIC ACTIVITY: METHODS OF ANALYSIS AND FORECASTING

Anna Yu. Kosobutskaya

Voronezh State University, Russia
E-mail: anna.rodnina@mail.ru

Yuri I. Treshchevsky

Voronezh State University, Russia
E-mail: utreshevski@yandex.ru

Elena A. Opoikova

Voronezh State University, Russia
E-mail: oea.voronezh@yandex.ru

Abstract. The paper looks to identify and forecast the trends in foreign economic activity of Russian regions that reflect the state of their competitiveness. The study used: cluster analysis - to identify homogeneous groups of regions with similar parameters of different types of foreign economic activity; comparative analysis - to establish model regions reflecting the specific aspects of development of the respective clusters; correlation and regression analysis - to identify and predict the dynamics of foreign economic activity parameters reflecting the competitiveness of Russian regions. The study reveals the specific aspects of changes in the competitiveness of the typical «average» regions of Russia — Voronezh and Yaroslavl oblasts. We have determined the actual dynamics and forecast of indicators of various aspects of regional competitiveness, such as imports from non-CIS countries, exports to non-CIS countries, imports and exports of technologies and technical services, foreign direct investment. The forecast range is 2020-2024.

Keywords: Russian regions, foreign economic activity, competitiveness, export, import, foreign investments.

JEL codes: C1; R11; R 13

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Introduction

Numerous works of Russian and foreign researchers are devoted to the assessment and forecast of processes in foreign economic activity of the regions. (Kuzmina, Timchenko, Naumik, 2020; Timokhin, 2019; Treshchevsky et al., 2020)

Various research papers note the significant impact of globalization in the economic and political areas of countries and regions on their competitiveness and the development of foreign economic relations (Freire, 2019; Head, Mayer, 2010; Dorin et al. 2016; Endovitsky, Treshchevsky, Terzi, 2020).

Researchers around the world note the diversity of regional systems competitiveness factors (Bitarova et al., 2019). One of the most important conditions for regional competitiveness is the overall state of financial systems at different levels — from the global to the micro-level (Radyukova et al., 2018; Endovitskaya, Risin, Treshchevsky, 2018; Lanskaya et al., 2018).

Authors of these works have different views on the purposes of development of foreign economic relations and the factors influencing them, but they are unanimous in the idea that their condition characterizes competitiveness of the countries, regions, and economic subjects.

Study methods

The analysis and forecast of the regions' competitiveness in foreign economic activity was done in several stages.

The first stage is the construction of virtual clusters of foreign economic activity of regions based on a wide range of indicators (Treshchevsky et al., 2020). We use a generally accepted method to analyze them (Hartigan, Wong, 1979; Mandel, 1988). The total number of clusters adopted for calculations is five (this number of clusters in most cases reflects the nature and level of differentiation of Russian regions by various combinations of social and economic indicators). Moscow is excluded from the calculations because its level of development of foreign economic activity is significantly higher than that of other regions. As such, the differences between the clusters are smoothed out against the advancement level of Moscow. The «second order» regions included in the larger ones are excluded from the calculations in order to avoid double counting. The regions for which no data are available for the entire analyzed period (2000-2019) are also excluded from the calculations.

The second stage is the selection of the time periods for which the virtual clusters are formed. Here is the list of years we have taken the data of to form the clusters: 2000 (the beginning of a new economy); 2005 (high conjuncture, but no overheating); 2009 (crisis worldwide — macroeconomic shock); 2012 (quiet year); 2015 (sanctions and counter-sanctions involving Russia - macroeconomic shock); 2018 (the last year for which all necessary statistics for clustering are available).

The third stage is the selection of «model» regions representing clusters with different levels of foreign economic activity development. For competitiveness analysis and forecast, we selected the medium development level cluster. In 2018, it included 21 regions. For further analysis, we used data on the development of the main parameters of foreign economic activity in the regions which were the closest to the center of the virtual cluster in 2018 and, accordingly, which characterized the cluster as a whole to the greatest extent. These regions were: Voronezh region, distance from the center 0.040449; Yaroslavl region, distance 0.040822; Vladimir region, distance 0.046200; Novosibirsk region, distance 0.047657. Given the limited length of the paper, we used only the data from the Voronezh and Yaroslavl regions.

The fourth stage is the selection of the main indicators reflecting its manufacturing, technical, technological, and financial aspects to analyze the region's foreign economic relations: imports from non-CIS countries; exports to non-CIS countries; imports of technologies and technical services; exports of technologies and technical services; foreign direct investments (inflow).

The fifth stage is choosing the time period to analyze the actual dynamics of the main indicators of foreign economic activity. Statistical data for the analysis were obtained from official statistical handbooks for 2002-2020, which helped with analyzing the data for 2000-2019 (Regions of Russia: 2002-2020).

The sixth stage is determining the forecast threshold. 2024 is chosen as the forecast threshold, which is a year in the middle of the time range of the Strategies of Russian Regions, which are planned until 2035.

The seventh stage is the selection of functions that reflect the dynamics of social and economic processes in Russian regions. The following functions are used to analyze the processes taking place in foreign economic activity and to forecast them: linear, power, logarithmic (by natural logarithm); polynomial; exponential. During the logical analysis, only those functions that have a sufficiently high determination factor ($R2 \geq 0.5$) are used for forecasting.

The methodological basis for the analysis and forecast of each process is, any process develops along several trends at the same time, each of which can develop further in the future with a sufficient level of function reliability. Thus, there is a basis to predict not one but several scenarios of development of the analyzed processes.

Results

The data on the regions' foreign economic relations with non-CIS countries that shows the competitiveness the best are used for analysis and forecast.

Estimation of the import volume as a competitiveness indicator stems from the fact that their growth

demonstrates positive changes in competitiveness. On the one hand, there is a demand for quality products in the manufacturing and consumer sectors; on the other hand, there are resources that are offered in payment for imported products and services. Actual and projected import trends from non-CIS countries in the Voronezh region are shown in Figure 1 and in Formulas 1-4.

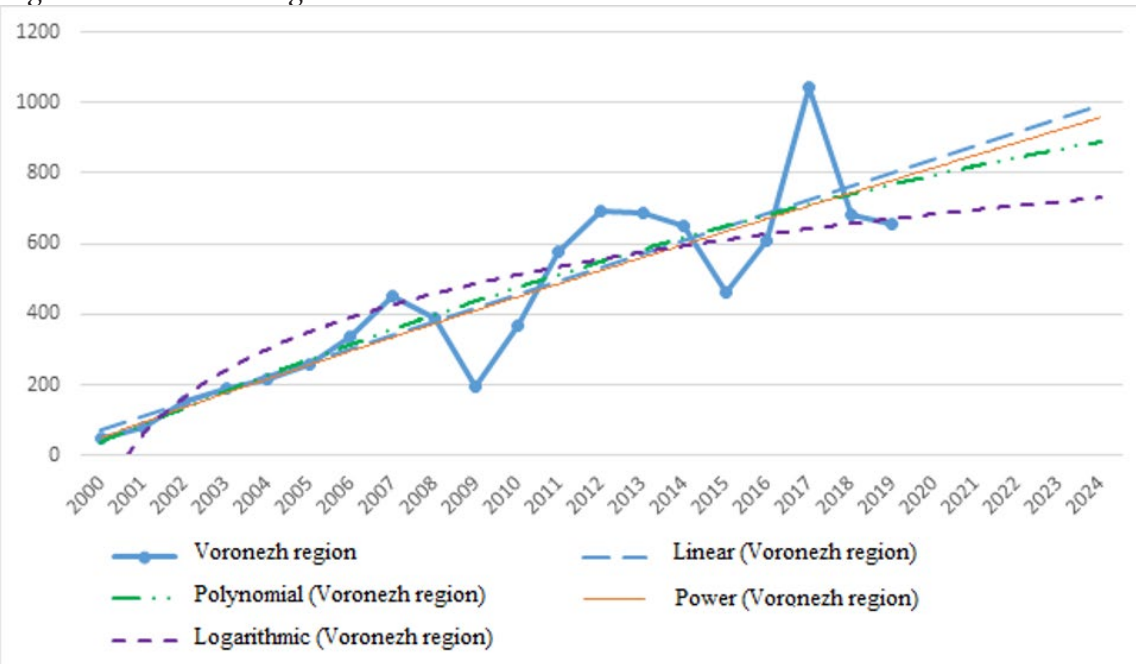

Figure 1. Imports to Voronezh region from non-CIS countries (million US dollars)
Source: composed by the authors

$y = 38.452x + 32.969$ (1); $R^2 = 0.772$
$y = -0.5947x2 + 50.942x - 12.826$ (2); $R^2 = 0.7769$
$y = 48.916x0.9241$ (3); $R^2 = 0.8996$
$y = 266.42\ln(x) - 127.23$ (4); $R^2 = 0.6994$

As it is seen from the data presented in Figure 1 and Formulas 1-4, there was a development along several trends with high determination factors throughout 2000-2019. This makes it possible to make at least three forecasts regarding imports to the Voronezh region from non-CIS countries. An optimistic (and hence conservative) forecast of the import volume dynamics is based on a linear dependence or a power dependence which is close to it; basic - by polynomial function, pessimistic - by logarithmic function. Actual and projected volumes of imports to the Voronezh and Yaroslavl regions from non-CIS countries are shown in Table 1.

Data on actual and projected imports from non-CIS countries in Yaroslavl region are shown in Figure 2 and in Formulas 5-8.

$y = 35.25x + 96.519$ (5); $R^2 = 0.717$
$y = -1.1367x2 + 59.696x + 8.9923$ (6); $R^2 = 0.736$
$y = 105.96x0.6314$ (7); $R^2 = 0.7192$
$y = 244.78\ln(x) - 45.456$ (8); $R^2 = 0.6317$

As it is seen from the data in Figure 2 and in Formulas 5-8, the nature of actual and projected import dynamics to the Yaroslavl region is close to the dynamics of the Voronezh region. The optimistic forecast is represented by a linear function; the basic one is either power or polynomial; pessimistic — logarithmic. The data on actual and projected imports to the Yaroslavl region are presented in Table 1.

As it can be seen, the initial positions of the Voronezh and Yaroslavl regions (2000) are completely different. Import volumes into the Yaroslavl region are three times higher. Further volume dynamics vary by year, but both areas have reached the same level of imports in 2019. The forecast of import volumes in 2024 according to the optimistic and pessimistic variants is almost the same for both regions; the basic variants

are very different. However, the same range of possible values suggests that the regions have reached the peak of competitiveness in terms of imports from non-CIS countries and the projected growth in its volumes is associated with positive quantitative changes in the economy as a whole. This is evidenced, in particular, by the linear nature of the optimistic trend. At the same time, some growth in imports from non-CIS countries is projected, even if the economic situation worsens.

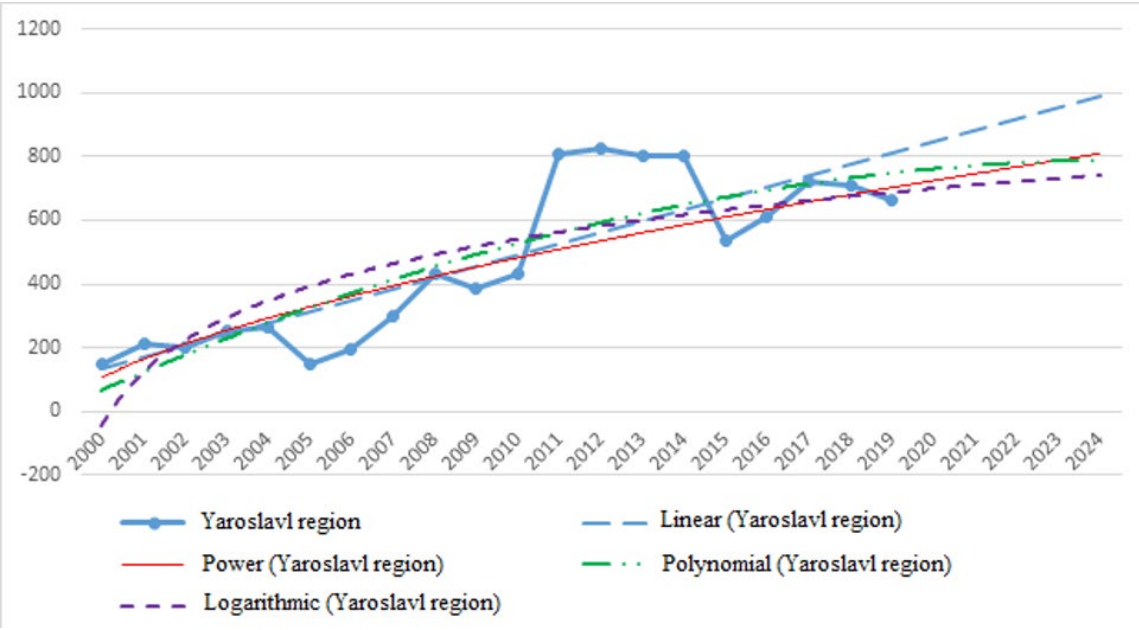

Figure 2. Imports to the Yaroslavl region from non-CIS countries (million US dollars)
Source: composed by the authors

Table 1 - Actual and projected dynamics of imports from non-CIS countries to the Voronezh and Yaroslavl regions

Region	External Trade (Imports) with the Non-CIS countries (at actual prices; million US dollars)							
	2000	2005	2009	2015	2019	2024 (linear)	2024 (polynomial)	2024 (logarithmic)
Voronezh region	48.7	258.7	196.9	462.4	653.3	955.8	867.2	719.5
Yaroslavl region	150.9	151.3	385.2	536.1	665.4	956.3	786.9	732.5

Source: composed by the authors

The actual and projected dynamics of exports from the Voronezh region to non-CIS countries is shown in Figure 3 and in Formulas 9-12.

$y = 40.052x + 172.58$ (9); $R^2 = 0.7456$
$y = -2.7042x2 + 96.84x - 35.648$ (10); $R^2 = 0.8353$
$y = 111.16x0{,}719$ (11); $R^2 = 0.8556$
$y = 298.62\ln(x) - 38.983$ (12); $R^2 = 0.7821$

As it is seen, four functions have a high degree of reliability, as in the case of imports. The optimistic (conservative) forecast variant is represented by a linear function (just below the value of the power function); base - logarithmic; pessimistic - polynomial.

Actual and projected export volumes to non-CIS countries from the Yaroslavl region are shown in Figure 4 and in Formulas 13-17.

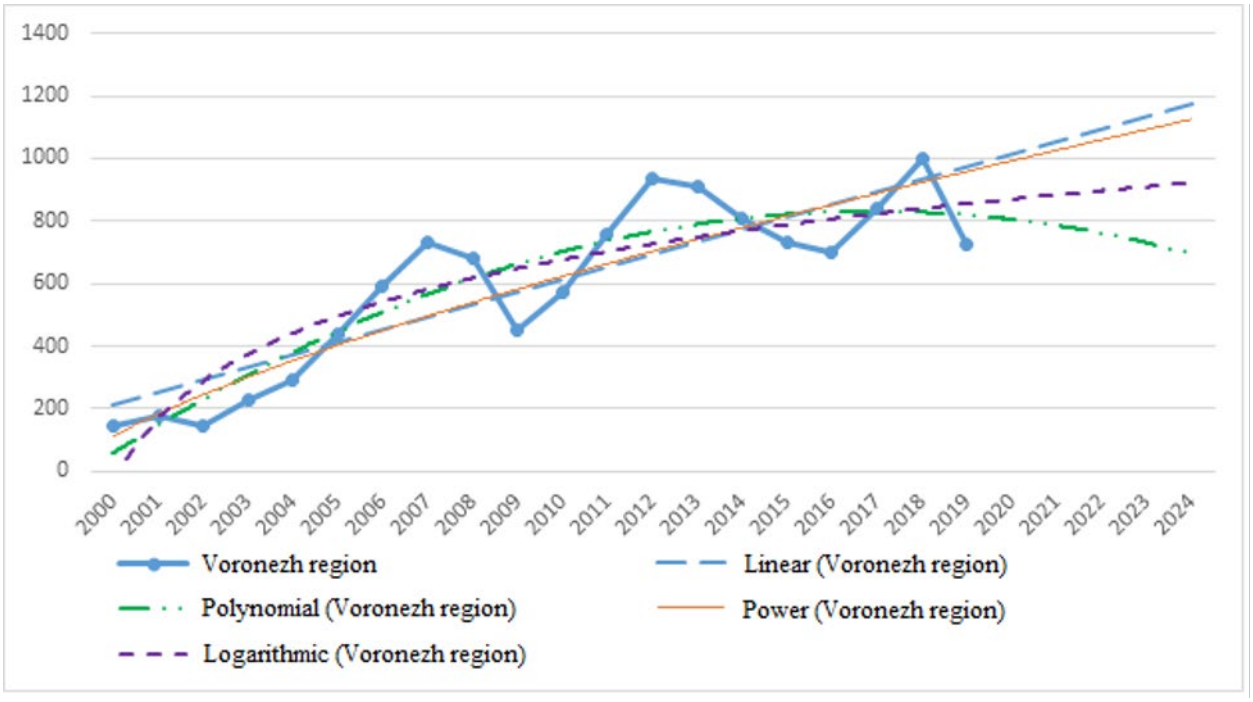

Figure 3. Exports from Voronezh region to non-CIS countries (million US dollars)
Source: composed by the authors

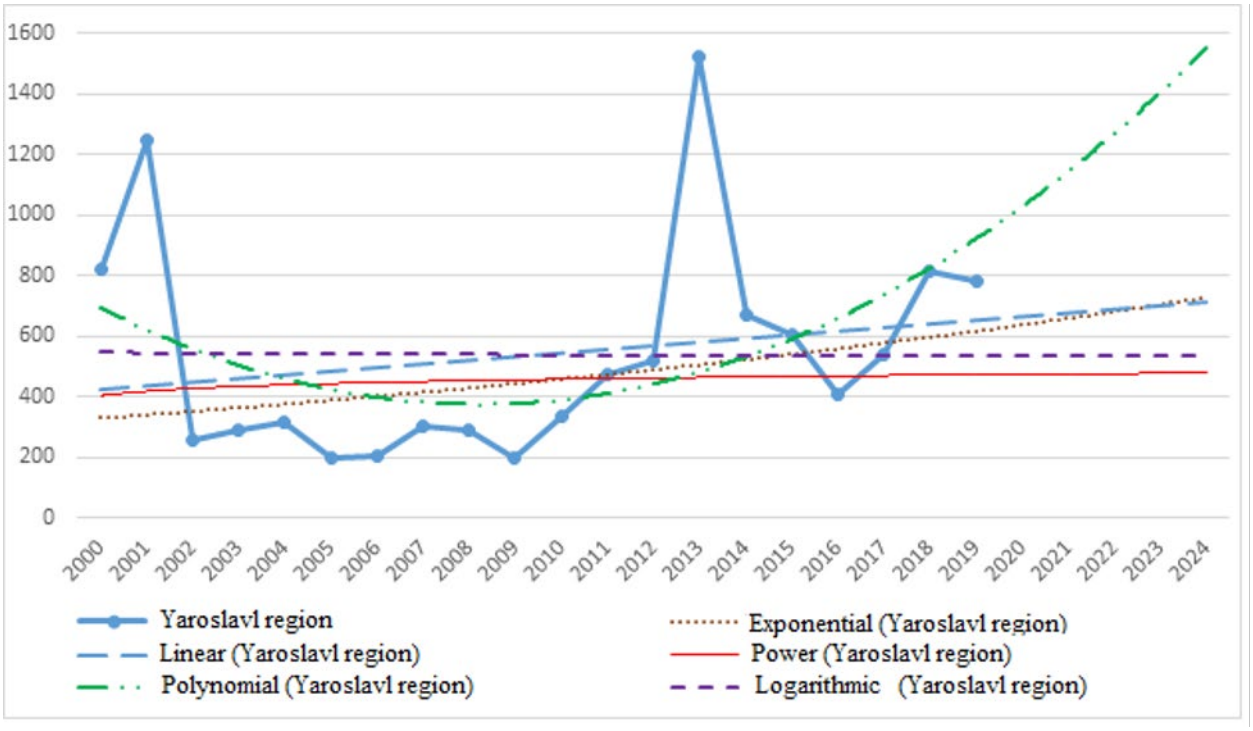

Figure 4. Exports from Yaroslavl region to non-CIS countries (million US dollars)
Source: composed by the authors

$y = 12.003x + 412.94$ (13); $R^2 = 0.0396$
$y = 4.7214x2 - 87.146x + 776.49$ (14); $R^2 = 0.2012$
$y = 402.35x0.0533$ (15); $R^2 = 0.0052$
$y = -3.829\ln(x) + 547.08$ (16); $R^2 = 8E\text{-}05$
$y = 318.23e0.0331x$ (17); $R^2 = 0.1059$

As it is seen, the exports from the Yaroslavl region as a whole is not lower than that of the Voronezh region. However, low determination factors and strong, but short-lived «bursts» of activity in this area allow

us to conclude that random factors have a significant impact on the Yaroslavl region competitiveness in the export of products and services. In this case it is not possible to make a sufficiently reliable forecast of export volumes.

An important area of foreign economic activity characterizing the competitiveness of regions is technology exchange, which reflected in the indicators of technology import and export. The actual and projected volumes of technology imports from the Voronezh region are shown in Figure 5 and in Formulas 18-21. It should be noted that the methodology for calculating this indicator has changed over the period under analysis. Because of this, it is impossible to analyze the actual state of the process over the entire time period. Therefore, the analysis is based on actual data for the period from 2007 to 2019.

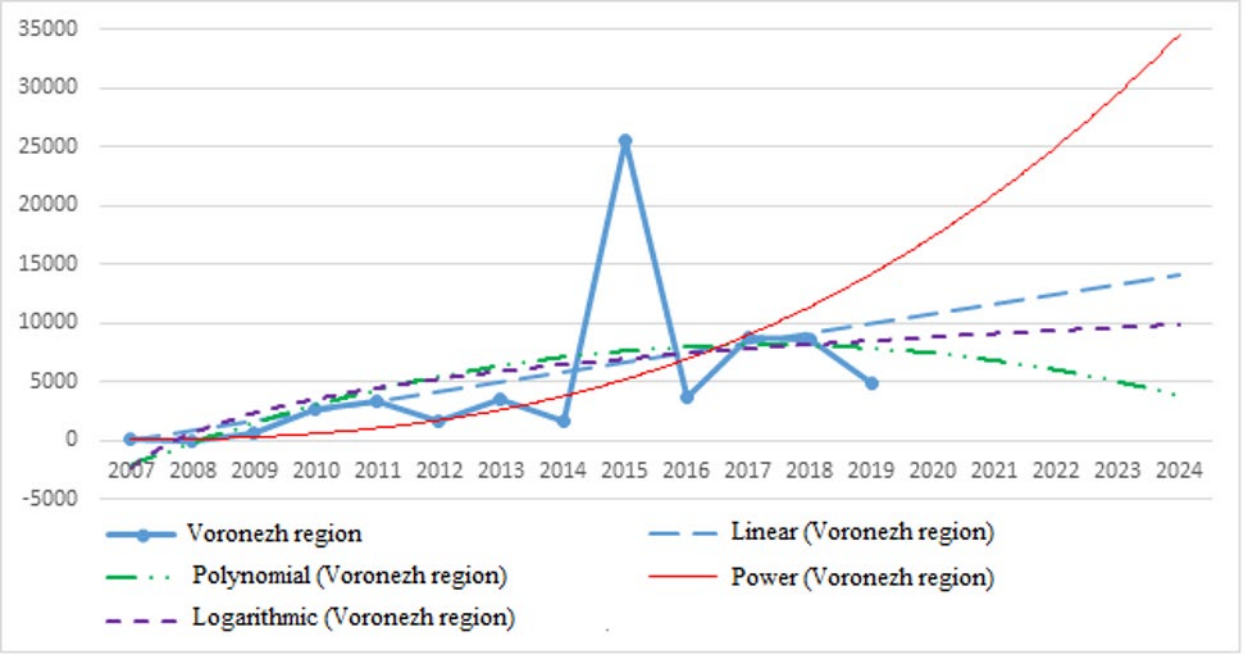

Figure 5. Imports of technologies and technical services to Voronezh region (thousand US dollars)
Source: composed by the authors

$y = 828.82x - 827.94$ (18); $R^2 = 0.226$
$y = -96.601x2 + 2181.2x - 4209$ (19); $R^2 = 0.2598$
$y = 12.372x2.7455$ (20); $R^2 = 0.7093$
$y = 4213.8\ln(x) - 2336.3$ (21); $R^2 = 0.2257$

As it is seen, all equations describing the actual dynamics of imports of technologies and services of technical nature have low determination factors. The only function where this factor has a sufficiently high value is a 2.7 power function, which cannot be considered it reliable. The function recorded a high trend from 2007-2013 and a «spike» in activity in 2015. The dynamics of 2016-2019 show that such optimistic developments in this area of economic relations are impossible. It is not possible to predict reliably the dynamics of import of technologies, services of technical nature and, accordingly, the competitiveness of the Voronezh region within the technical and technological relations with foreign countries.

The situation is similar in the Yaroslavl region (Figure 6, Formulas 22-25).

$y = 956.04x + 1875.9$ (22); $R^2 = 0.3866$
$y = -61.434x2 + 1816.1x - 274.26$ (23); $R^2 = 0.4042$
$y = 366.73x1.5186$ (24); $R^2 = 0.6236$
$y = 5112\ln(x) - 300.04$ (25); $R^2 = 0.427$

As we can see, the Yaroslavl region surpasses the Voronezh region by the overall level of competitiveness in the field of technology import (Table 2), however, its further development cannot be predicted.

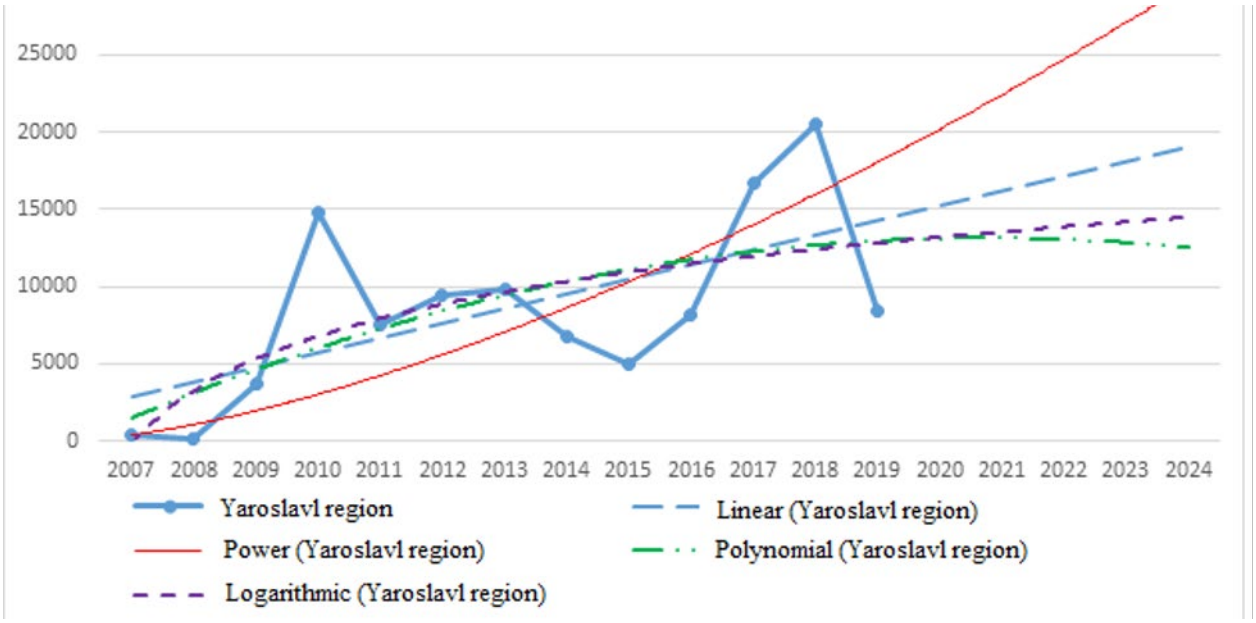

Figure 6. Imports of technologies and technical services to Yaroslavl region (thousand US dollars)
Source: composed by the authors

Table 2 - Imports of technologies and technical services to Voronezh and Yaroslavl regions (thousand US dollars)

Region	Import of Technologies and Technical Services (thousand US dollars)					
	2007	2009	2012	2013	2015	2019
Voronezh region	25.9	623.8	1574.0	3541.5	25569.0	4799.4
Yaroslavl region	440.8	3732.4	9491.1	9801.9	4910.6	8455.7

Source: composed by the authors

Table 2 demonstrates: higher level of competitiveness of the Yaroslavl region in the field of import of technologies and technical services; sharp changes in the indicator values in both areas and their high dependence on external factors. None of the functions used for the analysis showed a sufficient value of the determination factor.

Dynamics of exports of technologies and technical services are uneven, demonstrating the same trends as imports (Table 3).

Table 3 - Exports of technologies and technical services from Voronezh and Yaroslavl regions (thousand US dollars)

Region	Export of Technologies and Technical Services (thousand US dollars)					
	2007	2009	2012	2013	2015	2019
Voronezh region	183.1	8883.3	3197.2	3660.5	5303.5	139.4
Yaroslavl region	8.6	6830.7	10058.7	14095	1538.7	478.8

Source: composed by the authors

One important area of competitiveness of a region is its ability to attract foreign direct investment (FDI). The dynamics of FDI (inflow) in the Voronezh region is shown in Figure 7, Formulas 26-27. The specifics of the analysis of this indicator is the change in the methodology of calculations during the analyzed period. Unchanged methodology is specific to the period 2011-2019 only. This somewhat impairs forecasting

capabilities, but a period of eight years is considered acceptable if the determination factor is sufficient.

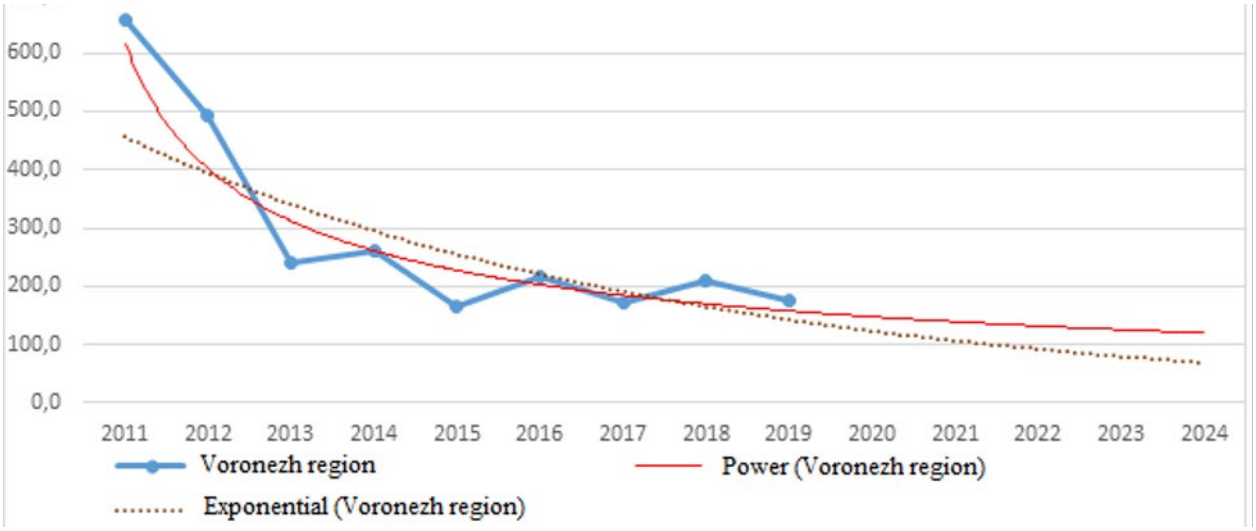

Figure 7. Foreign direct investments (inflow) in Voronezh region (million US dollars)
Source: composed by the authors

$y = 616.67x-0.621$ (26); $R^2 = 0.8515$
$y = 526.37e-0.145x$ (27); $R^2 = 0.6729$

As in the previous cases, there is a contradiction between the sufficient level of determination factor and the logic of the analyzed economic process. In this case, such a contradiction is inherent to the polynomial function which has the maximum determination factor (0.9036), but demonstrates an overly optimistic forecast for the period up to 2024. The opposite dynamics was demonstrated by the linear and logarithmic functions, which took negative values in the forecast period. In this regard, two functions are used for forecasting, on the basis of which the forecasts until 2024 are built. The optimistic forecast is a power function; the baseline forecast is an exponential function.

However, it should be noted that the «optimism» of the power function is rather relative — it shows a decline in FDI in the period up to 2024. To an even greater extent, the falling trend is characteristic of the exponential function. Quantitative indicators reflecting actual and projected FDI dynamics are presented in Table 4.

Actual and projected volumes of FDI in the Yaroslavl region are shown in Figure 8 and in Formulas 28-29.

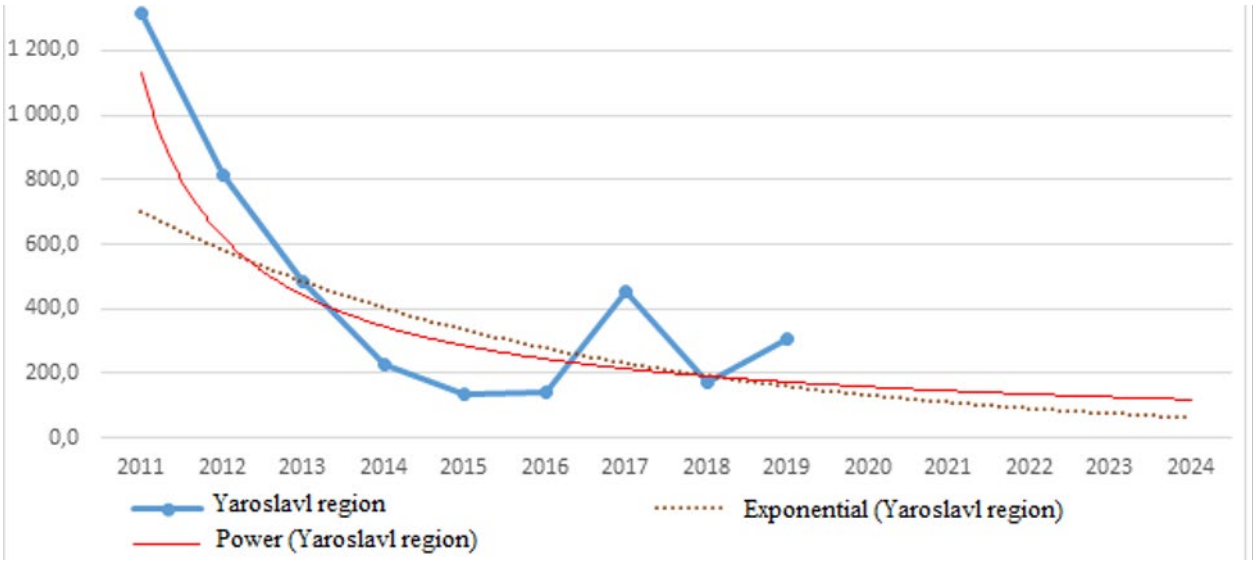

Figure 8. Foreign direct investments (inflow) in Yaroslavl region (million US dollars)
Source: composed by the authors

$y = 1129.4x-0.854$ (28); $R^2 = 0.5995$
$y = 844.96e-0.185x$ (29); $R^2 = 0.4076$

As can be seen from the data presented in Figures 7, 8, in Formulas 26-29, the trends in both regions are quite similar. As in the prediction of FDI dynamics in the Voronezh region, in the Yaroslavl region the polynomial and linear functions were excluded from consideration, despite rather high values of determination factors. Among the remaining functions, the optimistic forecast is demonstrated by the power function, while the basic one - by the exponential function (with an insufficiently high determination factor). The actual and projected values of FDI in the Voronezh and Yaroslavl regions are shown in Table 4.

Table 4 - Foreign direct investments (inflow) in Voronezh and Yaroslavl region (million US dollars)

Region	Foreign Direct Investment in Voronezh and Yaroslavl Regions (mln US dollars)							
	2011	2012	2013	2015	2017	2019	2024 (optimistic forecast)	2024 (base forecast)
Voronezh region	655.0	491.0	239.0	166.0	172.0	174.0	85.7	16.2
Yaroslavl region	1,316.0	813.0	481.0	138.0	452.0	308.0	74.8	9.9

Source: composed by the authors

As it is seen from the data presented in Figures 7, 8 and Table 4, the competitiveness of regions in terms of attracting foreign direct investment is declining. A further decline in the competitiveness of both regions in this area of foreign economic activity is projected for the period up to 2024.

Conclusion

The analysis of competitiveness dynamics in the Voronezh and Yaroslavl regions, which represent a large group of averagely-developed Russian regions, showed different trends in trade, technical, technological, and financial relations.

Stable positive dynamics is forecast in the sphere of commodity relations. The actual dynamics and forecast of competitiveness of the Voronezh and Yaroslavl regions in terms of imports from non-CIS countries demonstrates three possible scenarios: optimistic, basic, and pessimistic. Either way, a fairly steady growth in imports from non-CIS countries is projected, indicating an increase in competitiveness in this area.

The actual and projected dynamics of exports to non-CIS countries in the analyzed regions are different. The Voronezh region can rather reliably forecast a steady growth of exports to non-CIS countries under any scenario. The optimistic (conservative) forecast variant is represented by a linear function (just below the value of the power function); base - logarithmic; pessimistic - polynomial.

In the Yaroslavl region the actual export dynamics is extremely uneven. It is impossible to sufficiently reliably characterize the actual trends of the indicator and predict the dynamics of exports in this region, which indicates a high dependence of the competitiveness of products and services on external factors.

By the general level of competitiveness in the export and import of technologies the Yaroslavl region exceeds the Voronezh region, however, due to the volatility of the dynamics of indicators, their forecasting for any long period is impossible. Regional competitiveness in this area depends mainly on external factors.

One of the most important indicators characterizing regions' competitiveness in foreign economic activity is the volume of foreign direct investment. In both regions, the trend of declining competitiveness in attracting foreign direct investment is steadily negative.

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INTEGRAL INDEX OF INNOVATIONS OF A CONSTRUCTION FIRM AS THE FACTOR OF ITS INCREASED COMPETITIVENESS

Anna O. Mikhailova

St. Petersburg State University of Architecture and Civil Engineering, Russia
E-mail: anneym@mail.ru

Aleksander A. Skidan

St. Petersburg State University of Architecture and Civil Engineering, Russia
E-mail: aleksanderskidan@mail.ru

Abstract. The paper is devoted to the development of integral index of innovation, which can be used in investment and construction. The research includes the analysis of innovation in construction in Russia, and also a multi-factor assessment of indicators of innovation of a construction firm. The proposed approach to assessment of companies' innovation was successfully tested on a number of construction firms.

Keywords: innovation, innovation activity, integral index, competitiveness, innovative development of construction.

JEL codes: O32, L26, C13

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Introduction

Today, one of the key elements of the national innovation system is construction firms. It is necessary to consider their impact when forming technology strategies and prioritizing the areas where available resources will be focused. That is why it is important to take into account their innovation and to approach its assessment reasonably. The increase in innovation directly affects the innovation attractiveness of construction firms, increasing their competitiveness in the market. At the same time, the economic and technological development of the country arguably depends on the aggregate index of innovation of the construction market entities, increasing the competitiveness of the Russian economy in the world markets.

The assessment of innovation performance includes both the analysis of the organization's activities and the analysis of the effectiveness of innovation management. The problem is that the investment analysis methods are not enough for assessment. Since innovation projects are more long-term, expensive, and risky than investment projects, their effectiveness can be assessed by selecting optimal financing schemes, as well as assessing technological and strategic effectiveness of innovation in a firm, region, or country as a whole.

The assessment of innovation effectiveness in construction firms should become more informative, therefore, it requires a new methodology. Another relevant issue is increasing innovation sustainability of Russian regions or knowledge-intensive areas by increasing the competitiveness of individual firms in the region. This increase, in turn, contributes to a better overall competitiveness in the market. The sustainability should also increase due to the rapid response to internal and external challenges through the use of scientific advances.

Sources and methods

We used expert survey and correlation analysis to conduct the research and form the integral index.

The research subjects are the assessment of efficiency of innovation in the investment and construction areas as well as the indicators used in calculation. The research focuses on the process of calculating the integral index of innovation in construction firms.

Analysis of innovation in Russia

In the current social and economic conditions, innovation is becoming increasingly relevant in Russia. Innovation can be understood as both new developments and technologies as well as related concepts.

Modern construction firms have to meet the internal and external demands to their activity in a highly competitive environment. Innovation contributes to the gradual transformation of this activity to meet the current demands (Nikiforova, 2014). Today, the technological and technical development of companies is uneven. All economy sectors without exception are lagging behind the demand for innovative development (Simionova, Simionov, 2018).

The data of the Federal State Statistics Service shows that innovation in Russia reached its peak in 2011, after which it declined gradually until 2014, when the share of organizations engaged in innovation reached 9.9%. In 2017, the innovation increased by 0.1% compared to the previous year. This could have happened due to a 9% increase in investment in 2017 compared to the previous year (Skidan, 2019).

Next, we analyzed the dynamics of development of advanced manufacturing technologies across all design and engineering technologies in investment and construction in Russia.

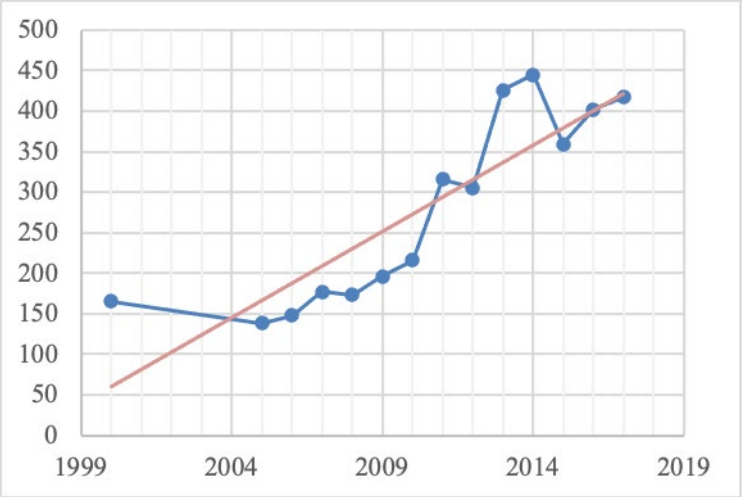

Figure 1. Dynamics of development of advanced manufacturing technologies in engineering and design
Source: composed by the authors

The available data leads to a conclusion that the dynamics of the developed advanced technologies in the investment and construction is growing. One can also see a jump in the number of technologies. The chart shows a sharp drop in the number of technologies developed every 4 years. This is the period of time required for an innovation to be actively used and give a certain result in any industry. The development of advanced technologies in the investment and construction sector reached its peak in 2014, when the number of technologies under development reached the 445 mark.

Also, according to the chart, there was a 19% drop relative to the previous year. It could have happened because of the pressure on foreign policy and foreign economic factors. Currently, there is a 4% increase in the development process compared to 2016.

The next step was to examine the relationship between the number of advanced technologies developed and the number of advanced engineering and design technologies in use in Russia.

The chart shows that the highest use of innovation occurs in 2010, followed by a sharp drop of 27% in 2011. At the moment, it keeps growing since 2014. The use of advanced technologies is increasing each year by 2% compared to the previous year.

Data on the number of advanced technologies developed and in use are presented in Table 1.

The data presented was used in a correlation analysis. The calculation of Pearson's correlation factor showed that the number of advanced technologies developed and the number of advanced technologies in use have an average negative correlation ($r = -0.41$), which means that when the development of advanced technologies increases, their use decreases, and vice versa.

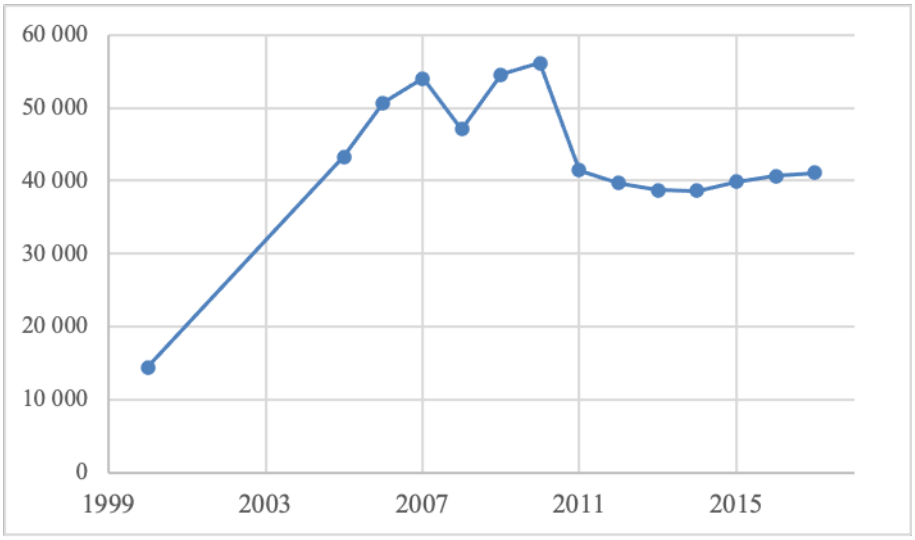

Figure 2. Dynamics of advanced manufacturing technologies used in engineering and design
Source: composed by the authors

Also, note that the correlation factor is considered to be significant and has a medium correlation dependence, since a small amount of data is analyzed.

Table 1 - Analysis of advanced manufacturing technologies in the investment and construction sector

Year	Number of developments	Growth rate	Number in use	Growth rate
2000	165	-	28888	-
2005	138	-27	43273	28888
2006	148	10	50653	7380
2007	177	29	54044	3391
2008	173	-4	47116	-6928
2009	196	23	54539	7423
2010	216	20	56130	1591
2011	316	100	41422	-14708
2012	305	-11	39664	-1758
2013	426	121	38735	-929
2014	445	19	38598	-137

Source: composed by the authors

The analysis of innovation shows several factors which hinder innovation development of the Russian economy, including insufficient protection of the legal ownership of the results of innovation (Skidan, 2019).

Also, the factors that hinder innovative development include an insufficient number of qualified specialists for the effective use of the results of intellectual activity in commercial and scientific organizations (Larkina, 2016).

At the same time, based on the above, it can be argued that there is also a problem of determining the impact of innovation on the organizational activities of construction firms. For further analysis, it is necessary to conduct a regional analysis of innovation activity in Russia.

Innovation in the north-western federal district of Russia

Over the past few years much attention has been paid to the regional aspect of innovation in Russia, since it is the regions that are the subjects of economic growth. The place is important because the development and implementation of innovations takes place exactly in the region with its own formed scientific potential that

affects innovation (Lastochkina, 2018).

Statistical research is usually based on the following factors, which determine the position of the region in the overall innovation rating:

- availability of research centers, various universities, academic campuses, etc.;
- special economic zones, innovation clusters, and high-tech military and nuclear industries in the region.

Let us observe the innovation of the North-Western Federal District. The North-Western Federal District includes ten subjects of Russia: The Republic of Karelia and the Komi Republic, Arkhangelsk, Vologda, Kaliningrad, Leningrad, Murmansk, Novgorod, and Pskov regions, as well as St. Petersburg (Lastochkina, 2018). Table 2 shows the innovation performance in the Federal District in 2019.

Table 2 - Indicators of innovation in NWFD

Region	1*	2*	3*	4*
Komi Republic	2.3	2390	853.5	49
Arkhangelsk region	0.5	1577	1513	59
Vologda region	4.3	411.9	578.4	114
Kaliningrad region	0.2	1293	1066	72
Leningrad region	2.3	964.9	123.5	17
Novgorod region	3.0	6335	12639	140
Pskov region	1.2	2405	1239	50
St. Petersburg	8.7	1695	1816	38
The Republic of Karelia	0.3	430.5	203.2	40
Murmansk region	1.5	114471	67845	2072

Source: composed by the authors

Where: 1* is the volume of innovative goods, works, and services (%); 2* is the internal R&D costs (million rubles); 3* is the cost of technological innovations (million rubles); 4* is the number of patents for utility models and inventions.

The above data confirm the fact that the volume of innovative products and services produced is still at a low level, with a regional division into leading and lagging subjects of the NWFD. In 2019, St. Petersburg had the highest indicator at 8.7%. In the Republic of Karelia, Arkhangelsk, and Kaliningrad regions, this indicator did not exceed 1% (Lastochkina, 2018).

Based on the costs of research, we can conclude that the innovation in Russian companies decreased by 2% annually during the analyzed period. The same trend is observed in the North-Western Federal District by an average of 3%, and in St. Petersburg by 4.1%.

In general, summing up the analyzed indicators of innovation in the North-Western Federal District, in can be argued that there is a negative trend, as most indicators have decreased since 2010, when the region's innovation was at its peak.

The analysis shows that the subjects of the North-Western Federal District have a developed innovation infrastructure, there are research parks, technology centers, business accelerators. Also, the North-Western Federal District has taken measures at the administrative level aimed at developing innovation further.

However, one cannot claim that there is sufficient innovation of construction firms in NWFD. According to the Federal State Statistics Service, only about 8.5% of innovative goods and services come from construction firms in the North-Western Federal District.

Existing methods of assessing innovation

Most of the approaches to assessing the innovation in firms were reflected in the works of: Bogomolova (2014), Guseva (2004), Glagoleva (2013), Razdolskaya (2011), Serebryakova (2013), Syroizhko (2014) etc.

Two main approaches are commonly accepted in the scientific literature: collection and study of statistical characteristics and the use of calculated indicators. However, a simple indicator that reflects the innovation activity of an organization can be expressed both in physical (absolute and relative) terms, and in monetary terms (Syroizhko, 2014).

When studying the existing methods of assessing innovation activity, the Russian researchers usually pay attention to the Form of Federal State Statistical Observation No. 4-innovation "Information on the innovation of an organization" (Lastochkina, 2018). According to this Form, the innovation of an organization is assessed by three fundamental indicators:

- the presence of the completed innovations;
- share of the organization's involvement in the development of these innovations;
- identifying the main reasons why innovation did not take place.

The works of P. P. Nuretdinov and G. I. Gumerov reflect a similar method of assessing innovation. The proposed method consists in comparing the results of innovation by the study periods. Among the analyzed indicators one can single out survey costs, production of new types of products, acquisition of patents and licenses.

On the contrary, a number of other works do not assess the frequency and effectiveness of innovation, paying attention only to the available resources of the organization. Many methodological approaches to assessing innovation are difficult to apply in practice and therefore unattractive for modern organizations (Bogomolova, 2014).

Nevertheless, the analysis of existing approaches to the problem of assessment and research of innovation makes it possible to talk about the versatility of the studied characteristic and the importance of modeling its indicator, which is integral, describes all aspects of the problem being solved, and is accessible for understanding and use in the analysis (Syroizhko, 2014).

The use of multifactor assessment in the indicator formation

To form an integral index of innovation in a construction firm, first of all, it was necessary to form a multi-factor assessment of the construction firm in order to select indicators that make calculation possible.

For example, one of such indicators may be the increment of innovation cost at each stage of the manufacture of construction products, as, for example, in the works of Sood and Tellis (2009). Based on the study, it can be concluded that the increase of innovation cost is affected to a greater extent by the innovation development phase. Thus, in order to attract more market attention, companies should advertise their research and development as much as possible (Bogomolova, 2014). However, this condition does not apply to construction firms, because in construction, successful marketing of innovative processes and products does not properly affect the competitiveness of the construction firm and its products.

The work of O.N. Selyutina also presents factors that can limit the production of construction firms, including: competition from other construction firms, high cost of materials, structures, etc. (Selyugina, 2014).

Further, let us consider the results of Choi and Ko (2010). In their work, they proposed to assess the effectiveness of investments at the research and development stages, and their impact on innovation, using 4 groups of innovation metrics. As part of our research, these metrics were supplemented with factors applicable to the assessment of innovation in the investment and construction sector (Figure 3) (Shcherbina, Guzhva, Skidan, 2020).

Thus, we have identified the following key factors that contribute to the effectiveness of innovation in a construction firm:

- focus on technological and organizational innovation;
- company size and competitiveness;
- the key role of management in implementing innovative solutions;
- the volume of total investments in the company's operations (both current and capital), which can also be influenced by competitiveness and government support;
- qualified staff and employee training;

- inter-company cooperation.

The revealed indicators allow for a multi-factor assessment of innovative activity in a construction firm. Additional factors are fully able to reflect the innovative employment of an economic entity.

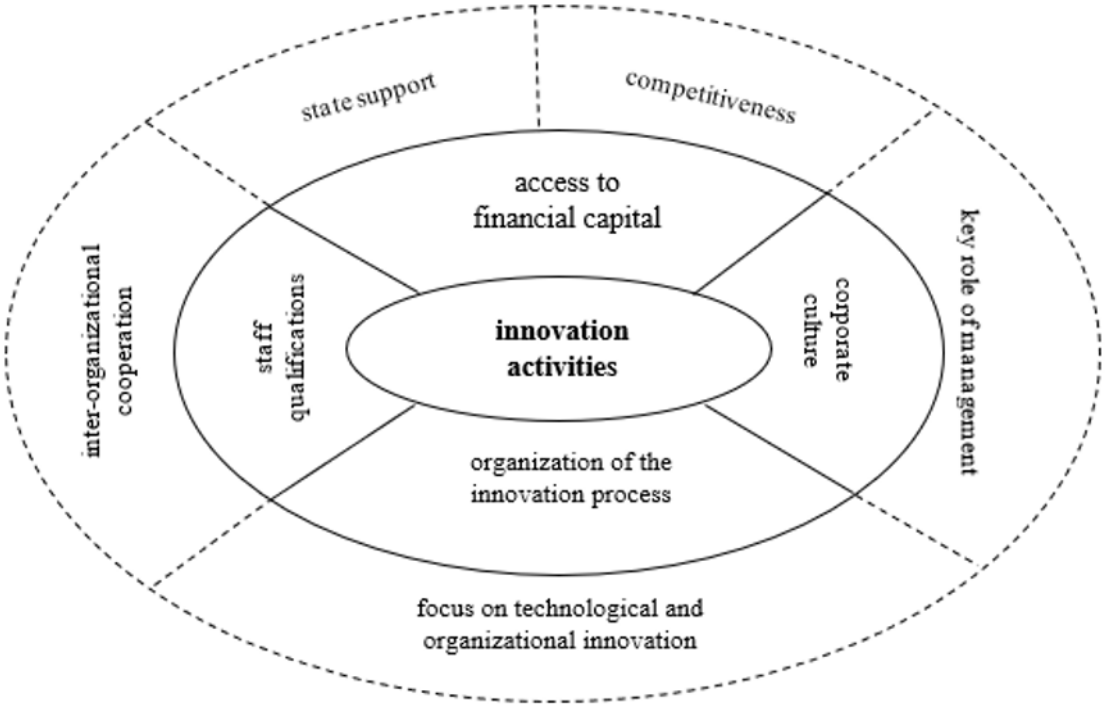

Figure 3. Augmented factors influencing the innovation of a construction firm
Source: Shcherbina, Guzhva, Skidan, 2020

Formation of an integral index

The next stage in the formation of an integral index of innovation was the selection of key performance factors. These factors were selected according to the following criteria:

- availability of source data;
- the openness and applicability of the indicator in the scientific literature;
- compliance with the factors affecting innovation.

Among the available indicators, four of them were selected as key, including focus on technological and organizational innovation, organization size, share of R&D costs in total volume, and staff qualification.

The selected indicators were standardized with an expert survey. 21 independent experts took part in the survey. The factors are evaluated on a ten-point scale of influence on the innovation in a construction firm.

Next, we checked the consistency of expert opinions for each factor using the concordance coefficient, which displays the consistency of expert opinions.

The coefficient is calculated according to Formula 1:

$$W = \frac{12 \times S}{m^2(n^3-n)} \quad (1)$$

Where: S is the sum of squares of rank differences, m is the number of experts, n is the number of factors.

$$W = \frac{12 \times 964{,}29}{21^2(4^3-4)} = 44\%$$

44% of experts agree, hence these expert assessments can be used.

Since the experts' opinions are consistent, then the median method is used to select the distribution of

the shares of factors that affect innovation. Based on expert assessment, the shares of the integral index are distributed as follows: focus on technological innovation is estimated at 0.28, competitiveness and personnel skills are estimated at 0.2, and total investment in R&D is estimated at 0.32.

The performance factors and the methodology for calculating them are presented in the following table.

Table 3 - Key indicators in indicator calculation

Factors	Calculation method
Focus on technological and organizational innovation	$I_1=\sum n +\sum m +\sum к$, where n, m, k are the number of patents and other intangible assets held by the organization
Company size and competitiveness	$I_2=\sum \Delta R+S$, where S is gross profit of the organization, ΔR is the difference between other income and expenses of the organization
Qualified staff and employee training	$I_3 = Rs / P$, where Rs is the number of ITR employees trained and educated in the current year; P is the average number of employees for the reporting year
Total investment in the company's operations	$I_4= \sum A / R$, where A is the amount of intangible assets of the organization;
	R is the revenue of the construction company for services in the reporting year

Source: composed by the authors

Taking into account the analysis, we propose to calculate the integral index of innovation in a construction firm according to the following formula:

$$I_{ИА}=\left(x_1\left(\frac{I_{1\ факт}}{I_{1\ план}}\right)\right)+\left(x_2\left(\frac{I_{2\ факт}}{I_{2\ план}}\right)\right)+\left(x_3\left(\frac{I_{3\ факт}}{I_{3\ план}}\right)\right)+\left(x_4\left(\frac{I_{4\ факт}}{I_{4\ план}}\right)\right), \quad (2)$$

where, x1, x3, x3, x4 are the shares in the integral indices I1, I2, I3, I4, respectively.

When applying the developed algorithm to calculate the developed indicator, there is a uniform evaluation of the obtained values. In modern social and economic conditions, we suggest gradation of the indicator values. It is considered satisfactory if the value is within 1. If the calculated indicator is within 0.6 to 0.9, then it can be thought as the average innovation of a construction firm.

The applicability of this indicator of innovation under current conditions was tested on five different organizations of the construction sector of the North-Western Federal District. The results of the calculation of the integral index are presented in the table.

Table 4 - Results of calculation of the innovation indicator for construction firms

Name	Value
Transbaltstroi	0.58
EvroTransStroi	1.17
Etalon LenSpetsSMU	1.12
Kompaniya Ust-Luga	0.98
Rif	0.96

Source: composed by the authors

The study showed that EvroTransStroi is the most active in innovation, compared to other organizations of different size. It can be concluded that ETS is more attractive for additional investments from private investors. Also, this organization is more adapted to the transition to an innovative way of developing the economy of Russia. It can also be argued that the size of an organization and its competitiveness do not significantly affect innovation.

Conclusion

As a result of the study, it was concluded that an increase in the indicator of innovation in construction firms can positively affect their competitiveness in the market, which in turn will favorably affect the overall state of the country's economy.

At the same time, there are currently no universal methodologies for assessing innovation in Russia. Under given conditions, as a result of the study, we have developed and proposed a methodology for assessing innovation and proved its applicability. This methodology is recommended for further analysis of other construction firms in the North-Western Federal District, as well as for the analysis of innovation in the investment and construction sector.

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STATE REGULATION OF INNOVATIONS IN CONSTRUCTION AS A MECHANISM OF INCREASING THE COMPETITIVENESS OF THE NATIONAL ECONOMY

Vadim A. Koscheev

St. Petersburg State University of Architecture and Civil Engineering, Russia
E-mail: npmos@bk.ru

Yuri A. Tsvetkov

St. Petersburg State University of Architecture and Civil Engineering, Russia
E-mail: yuriytsvetkow@yandex.ru

Alexandr V. Kryanev

St. Petersburg State University of Architecture and Civil Engineering, Russia
E-mail: akryanev@list.ru

Abstract. The paper considers theoretical aspects of innovations, problems of introduction of innovations in construction, and the main reasons for low acceptance of innovations in construction. The authors discuss the role of the state in the regulation of innovations, as well as its directions and methods. The paper presents a model of state regulation of innovations in construction which consists of five stages: setting strategic goals of economic development; identifying the specific aspects, problems, and barriers of innovations in construction; eliminating problems and barriers; creating policies to regulate innovations of construction; implementing the state regulation of innovations in construction.

Keywords: innovation, innovation activity, innovation action, state regulation of innovations, innovations in construction.

JEL codes: O38, O21, L32

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Theoretical aspects of innovation

In the era of globalization, total digitalization of business processes, and population growth, innovations play a special role in the functioning and development of the modern socio-economic system. How advanced the economic agents are in their mastering and implementation of the latest achievements of science and technology has always had a direct impact on the level of their competitiveness (Asaul, Koshcheev, Tsvetkov, 2020). Today innovations act as one of the most important factors of corporate competitiveness, their ultimate goal is to increase the profits of organizations, strengthening the position in the market. The term "innovation" has a rather broad meaning and can be interpreted differently. Let us review the concepts related to innovation in one way or another.

First of all, it is necessary to distinguish such concepts as discovery and invention. Discovery is considered the unearthing of previously unknown data as well as various natural phenomena. The main difference between a discovery and an innovation is that the former is not aimed at generating profit as the main goal. Innovation, on the other hand, is pursuing some kind of commercial gain. Also, a discovery can happen entirely by accident, without systematic work and searching. If we look at an invention, it covers the specific new tools, mechanisms, objects created by man to solve a particular problem.

The terms novelty and innovation sound quite similarly. However, novelty only precedes innovation, being something new and unique, and implies further application. At the same time, innovation is a product

that has already been brought to market.

Innovation is the delivery of a new product to the market or introduction of new ideas that can solve an organization's problems. Ideas that are intended for the organization, i.e., reducing costs, improving organizational networks, developing new systems are considered innovation, as well as generation, adoption, and implementation of new ideas, processes, products, or services (Kaporskii, 2020).

J.A. Schumpeter paid special attention to the development of the theory of innovation. Many interpretations of the term innovation are based on his research. J. Schumpeter notes that "to produce means to combine the things and forces within our reach, and to produce something else or otherwise means to combine the things and forces in other way" (Schumpeter, 1934).

In the Theory of Economic Development, J. Schumpeter distinguishes 5 cases of "new combinations":

1. The introduction of a new good or a new quality of a good;
2. The introduction of a new method of production;
3. The opening of a new market;
4. The conquest of a new source of supply or raw materials or half-manufactured goods;
5. The carrying out of the new organization of any industry, like the creation of a monopoly position, or the breaking up of a monopoly position (Baburina, 2020).

Let us consider the concept of innovation as an activity. As an activity, innovation is interpreted as work (certain occupation) aimed at creating innovation as a product, which is an integral part of the innovation process (Asaul, Faltinskii, 2010). At the same time, the innovation process is the development of innovation activity as a successive change of its states, i.e., repeated sequence of stages of implementation of an innovation as a product.

Innovation activity is also the result of interaction of professional and interdisciplinary knowledge, supported by innovation actions of staff, human resources of the organization, attitude of the staff to innovations. Innovation action in one way or another affects the innovation activity. Innovation action is one of components of the innovation activity and characterizes the intensity of innovations, the ability to transform the possibilities of the organization. V.V. Asaul provides an interesting interpretation of the innovation action: it is the implementation of all stages of a complex innovation cycle in one or more segments of the market (Asaul et al., 2004).

Innovation activity is possible thanks to a number of scientific, technical, organizational, and managerial activities done together, as well as all kinds of resources: financial, labor, intellectual. The development of many socially important economic phenomena is impossible without an active and systematic solution to emerging problems, which are of a strategic nature for all areas of economic activity.

Specific aspects of construction and problems of innovation in construction

At all times construction has been the most important element in the functioning of the economy, not only because it is aimed at meeting the priority needs of citizens in housing, but also because without the fixed assets (buildings, structures) the functioning and development of other important sectors of the economy (agriculture, engineering, transport, education, etc.) is impossible.

The following statistics show the importance of construction:

- About 7.5% of the employed population of Russia work in construction
- The works performed in construction in 2019 amounted to 9.132 trillion rubles, which is about 8.3% of Russian GDP
- There are about 278,000 of construction organizations in the Russian Federation (Labor force wages. Rosstat, 2019).
- Approximately 30% of all transported cargo is intended for direct consumption in construction (Baranovskaya et al., 2003).

Obviously, construction is a complex material and labor-intensive activity, with a large number of links between the interacting subjects, which distinguishes it from other activities. The life cycle of construction projects is usually long: from design, to construction of facilities and delivery-acceptance of works. The

process of construction is also significantly affected by natural and climatic conditions. For example, the same construction project would cost differently in St. Petersburg and in the Far North of Russia, at least because labor is more expensive in winter conditions. Due to its specific nature (labor-intensive, material-intensive, conservative, etc.), the introduction of innovations in construction is a problem (Koshcheev, Tsvetkov, 2018; Tsvetkov, 2019; Ablyazov, Vishnivetskaya, 2019).

Let us consider the state of innovation activity in Russia and in construction. According to various rankings of the level of innovative development of states, Russia is far from the top of the list. In the Global Innovation Index published in 2019 (Global Innovation Index, 2020), developed by INSEAD International Business School, Cornell University, and the World Intellectual Property Organization, Russia ranks 47th out of 129 presented in the report. The top three are Switzerland, Sweden, and the USA, respectively. According to the index compiled by the largest financial and economic news agency Bloomberg (These Are the World's Most Innovative Countries, 2019), Russia ranks 27th out of 60 possible by the level of innovative development. South Korea, Germany, and Finland top the ranking.

According to a study by the Higher School of Economics (HSE), as of 2018, Russia has the lowest aggregate index of innovation activity of organizations among the studied countries (Figure 1).

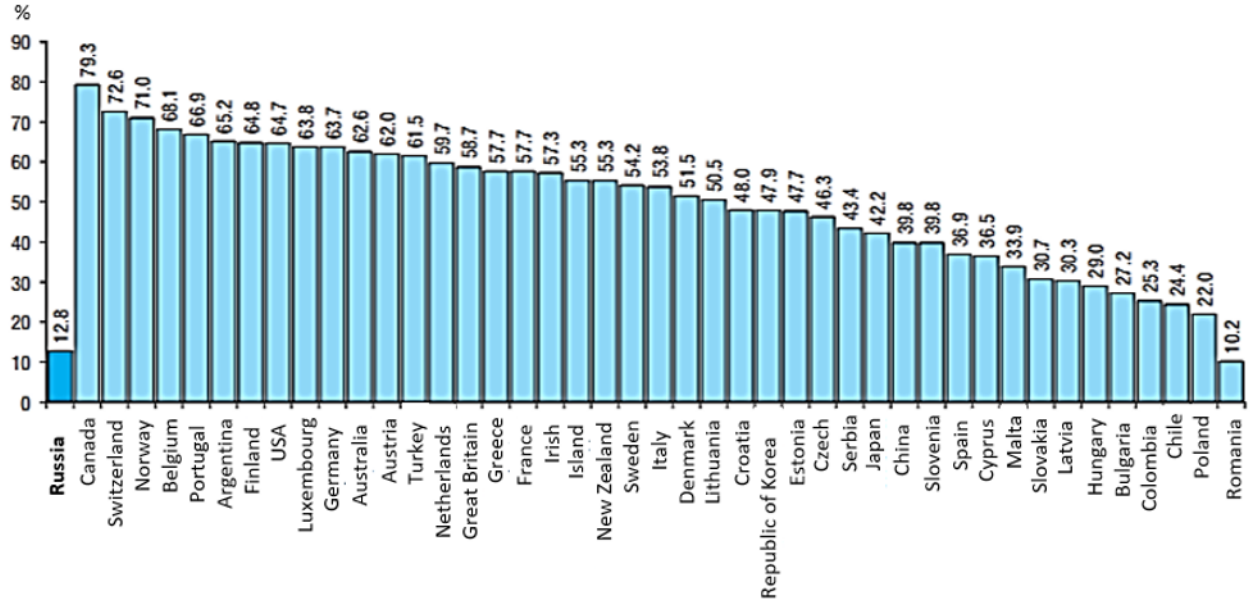

Figure 1. Aggregate level of innovation activity of countries
Source: https://www.hse.ru/primarydata/ii

As of 2018, the share of organizations implementing innovations was 12.8%. Among these organizations, 11.1% do the roofing, 7.5% do the specialized construction work, e.g., architecture and engineering design; 12.4% are engaged in technical testing, research and analysis (Rosstat, 2018).

Let us consider the level of development of innovation in construction by looking at the digital maturity in construction. The industry uses the digital technology more and more intensively but the level of digital transformation of an area varies. The Organization for Economic Cooperation and Development (OECD) (Measuring the Digital Transformation, 2019) provides data on the level of digital maturity of various areas of economic activity in European countries as of 2018 (Figure 2).

OECD experts argue that entrepreneurship in Europe has yet to unlock the full potential of digital transformation. On average, half of all businesses, excluding financial services, have no specific internal digital capabilities. In IT services and telecommunications, 40% to 80% of organizations have at least average capabilities. This aligns with an overall average of 20%, while in relatively low-tech areas such as textile and clothing, as well as transportation and warehousing, the figure is around 10%. Based on the data obtained, it is possible to identify the leading types of activities by the level of digital transformation (IT, tourism, wholesale trade) and relatively lagging behind (construction, food processing, textile and metallurgy).

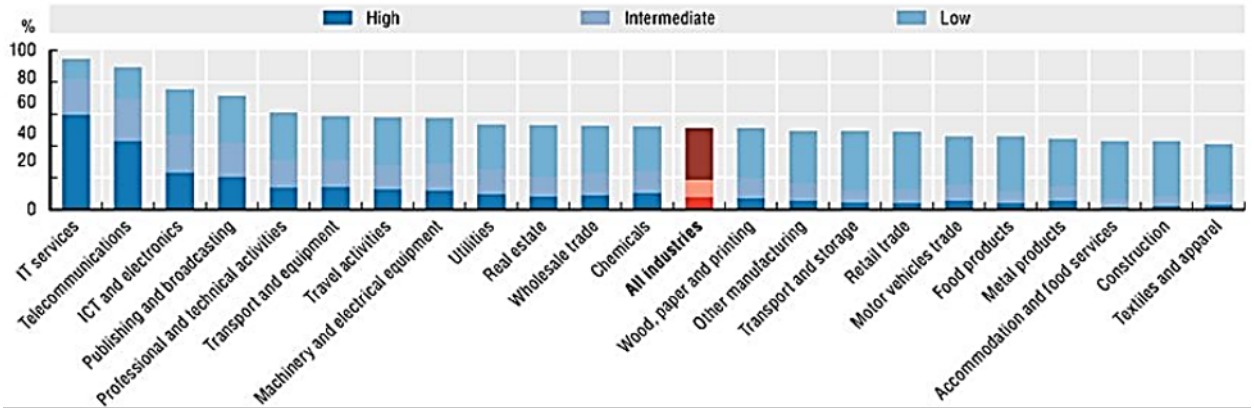

Figure 2. Level of digital maturity of economic activities in Europe

Source:https://nangs.org/analytics/oecd-measuring-the-digital-transformation-a-roadmap-for-the-future-march-2019-eng-online-summary-in-pdf-rus-eng

Figure 3. Share of newly implemented innovations in the total volume of shipped goods, performed works, services in 2018

Source: https://www.hse.ru/primarydata/niio

An important indicator of innovation activity is the share of newly implemented innovations in the total volume of shipped goods, performed works, and services. For example, the HSE researchers found that this indicator is 0.001% in construction (Figure 3).

What are the reasons for the low acceptance of innovation by construction businesses? The document entitled "Strategy for Innovative Development of the Construction Industry until 2030" highlights the following reasons to reduction of innovation activity in construction:

- low level of highly qualified staffing of the construction;
- insufficient level of investment (both domestic and foreign investment);
- insufficient completeness and transparency on the activities of construction entities;
- weak level of compliance of normative and technical documentation with modern innovation processes

in a number of cases;

- dependence on imported innovations;
- the mechanism of commercialization and transfer of innovations is underdeveloped;
- low level of implementation of innovations in construction.

The low level of interest from Russian organizations can be explained by the following theses:

- about 86% of all construction organizations are small businesses, these organizations do not have spare funds to spend on innovations.
- Russian construction businesses mostly borrow innovations rather than develop them;
- there is no system for assessing the effectiveness of innovative processes in construction;
- innovation activity is always a risk; if we are talking about construction, then it is not only commercial risks, but also the safety and operational risks (Strategy for Innovative Development of the Construction Industry until 2030, 2016).

Thus, we have highlighted quite objective reasons for the low level of innovation development of construction, which are related in one way or another to the specifics of construction, its aspects. It is certainly worth paying attention to this information when determining the direction and means of state regulation of innovations.

The role of the state in regulating innovation

Despite the fact that modern countries are mainly developing through the functioning of market and mixed economy, government regulation still exists in these countries and plays a significant role. The need for state regulation is driven by the need to level out the deficiencies of the market system, as well as the performance of a number of tasks for society by the state, such as:

- ensuring the country's security;
- support for socially vulnerable categories of citizens;
- fulfilment of social obligations to society;
- resource allocation;
- protection of the natural environment, etc.

There are several methods of state regulation:

- direct regulation such as direct participation of state structures in the economy, e.g. tariff policy, state investment, introduction of duties, etc.
- indirect regulation such the budgetary, tax, and monetary state policies.

Considering innovation activities, the state regulation of this sphere is directly related to the implementation of innovation policy through a number of measures for planning, management, adjustment, and stimulation of innovation processes.

State regulation of innovation activities is one of the directions of state regulation of the economy - a set of easures applied by the state to adjust and establish the main economic processes. The state regulation of innovation activity is based on innovation policy. The main task of innovation policy of the state is considered to be stimulation of innovation activity and its development through measures of state regulation of organizational and economic nature.

I.V. Zhuravleva in her study highlights a number of areas of state regulation of innovation activity (Zhuravleva, 2013):

- development and implementation of an effective model of state stimulation of innovation activity with the help of economic policy tools;
- development of the concept, strategy, principles, main directions of formation of the system of state regulation of innovation economy;
- institutional, fiscal, monetary, and administrative measures;
- development of innovation infrastructure;
- stimulation of innovation activity of existing organizations, promotion of new innovative organizations;
- formation of an innovative science and education sector;

- stimulating demand for innovative products;
- improvement of corporate, tax, export, and import legislation.

O.L. Kudryavenkova in her work identifies the following methods of innovation activity regulation (Kudryavenkova, 2013):

- formation of institutional and legislative conditions for implementation of innovations;
- state support and incentives for investors engaged in maintaining high-tech production facilities;
- organization and support of various forms of ownership;
- tax incentives, effective monetary policy, state guarantees to organizations practicing innovation activity;
- direct public investment;
- state innovation stimulation programs.

One of the main directions of support and stimulation of innovation activity is its financing. As a rule, innovative projects are highly costly and require significant funding, including from the government.

Figure 4 shows the structure of expenditures on technological innovation by sources of financing. By types of activity, there is 50.6% of own funds for the financing of innovations, 29.6% of federal budget funds, 0.7% of regional budgets, 0.1% of funds from innovation activity support funds, 1% of foreign investments, and 17.9% of other funds. In construction, the share of funds provided for the development of technological innovations from the federal budget is 65.9%, while the remaining 34.1% comes from the organizations' own funds. The situation is different in manufacturing. 65.9% are own funds, 13.1% comes from the federal budget, 0.3% comes from regional budgets, 0.1% comes from innovation support funds, 0.5% comes from foreign investments and the remaining 20% comes from other funds.

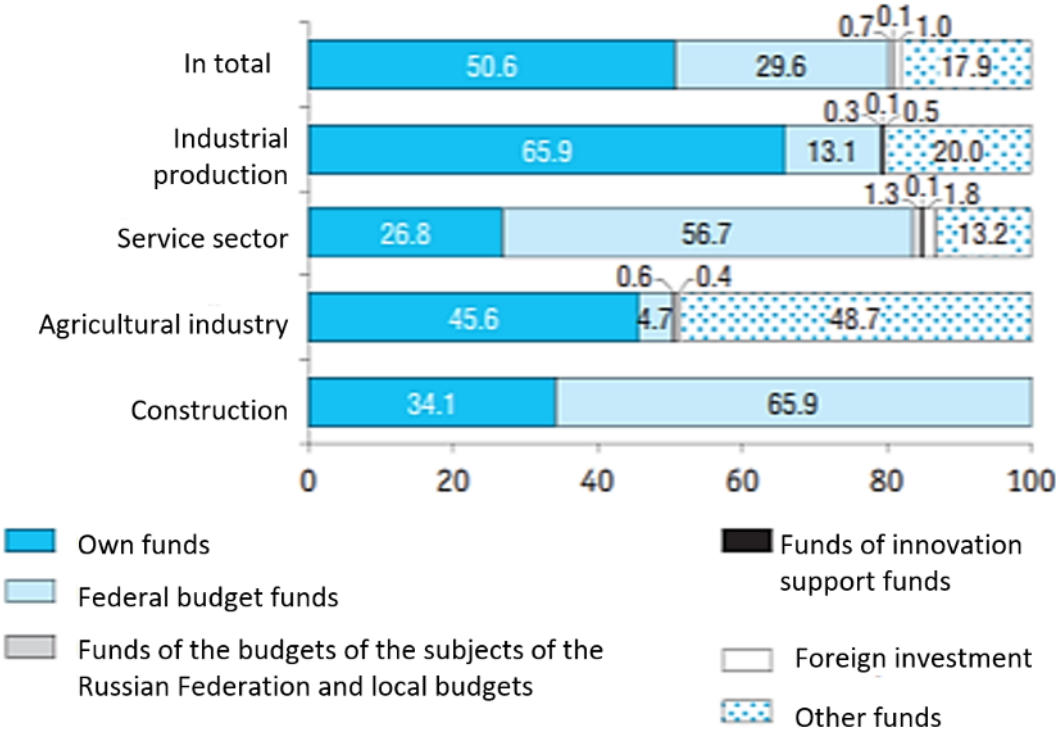

Figure 4. Expenditures on technological innovation by funding source in 2018
Source: https://www.hse.ru/primarydata/niio

According to the data shown in Figure 5, intensity of expenditures on technological innovations in construction is 0.03%. The leaders within this indicator are services and water suppliers, wastewater collection and disposal services with the values of 9.8% and 6.6%, respectively.

Thus, we can conclude that construction stands out from other activities in terms of financial support for innovation activities. The intensity of expenditures on innovation is extremely low; the structure of expenditures on technological innovation consists of own funds and federal budget funds as 34.1%/65.9%

accordingly; funds from the regional budgets, foreign investments, funding from funding institutions and other sources were not identified in the study (Science. Technology. Innovations. HSE, 2018).

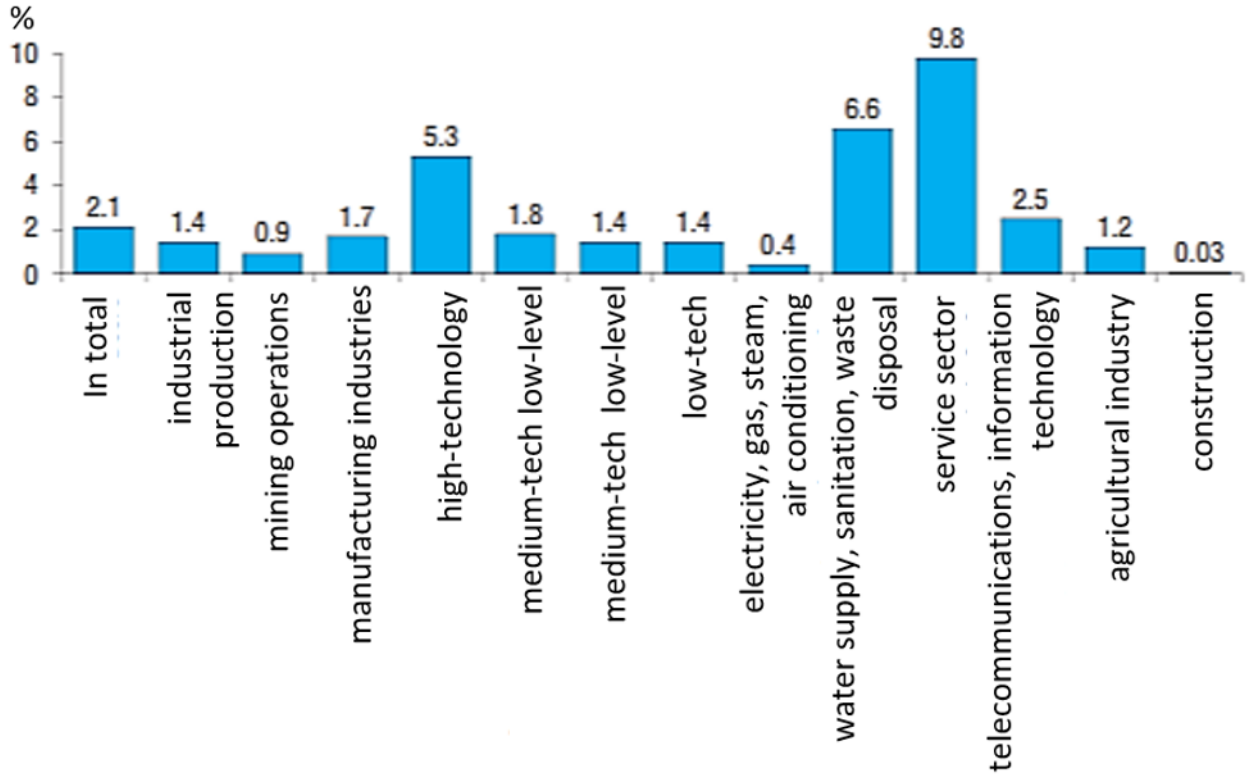

Figure 5. Cost intensity of technological innovation in 2018
Source: https://www.hse.ru/primarydata/niio

The model of regulation of innovation activity in construction

As the analysis of the situation with innovative development of construction activities in this study showed, this type of activity is not actively adapting to the innovation environment, the introduction of innovation in construction due to a number of objective reasons is difficult. Construction lags far behind innovative development trends compared to other industries. However, the most important task of strategic planning and macroeconomic forecasting is the uniform technological development of all types of economic activity and their harmonious interaction with each other. It is this aspiration that can lead to the maximization of the positive result of the national economy functioning.

Based on the above, we summarize that the regulation of innovation activities in construction is an urgent task for the economy, which requires a special approach. Considering the problems of innovative development of construction, its specific aspects and methods of state regulation identified earlier in the work, let us form the mechanism of state regulation of innovative activity in construction (Fig. 6).

This mechanism is based on the need to achieve the strategic goals of the state, which, in turn, will allow the state to better ensure the performance of its functions to the society. The second step is to identify problems and barriers to innovative development in construction. Once the barriers have been identified and recorded, it is necessary to formulate specific measures to remove them, primarily improve the normative and technical regulation, ensure favorable conditions for the transfer and commercialization of innovations, etc. Taking into account the adaptation of normative regulators, it seems possible to work out the policy of innovative development in construction, based on the development of mechanisms of stimulation and support of subjects of innovative activity, formation of the corresponding budgets, development of criteria of evaluation of efficiency of measures on support. The final stage is the implementation of direct financing of innovative activities in construction, while it is necessary to develop a mechanism of monitoring, audit, control, and evaluation of the effectiveness of spent funds.

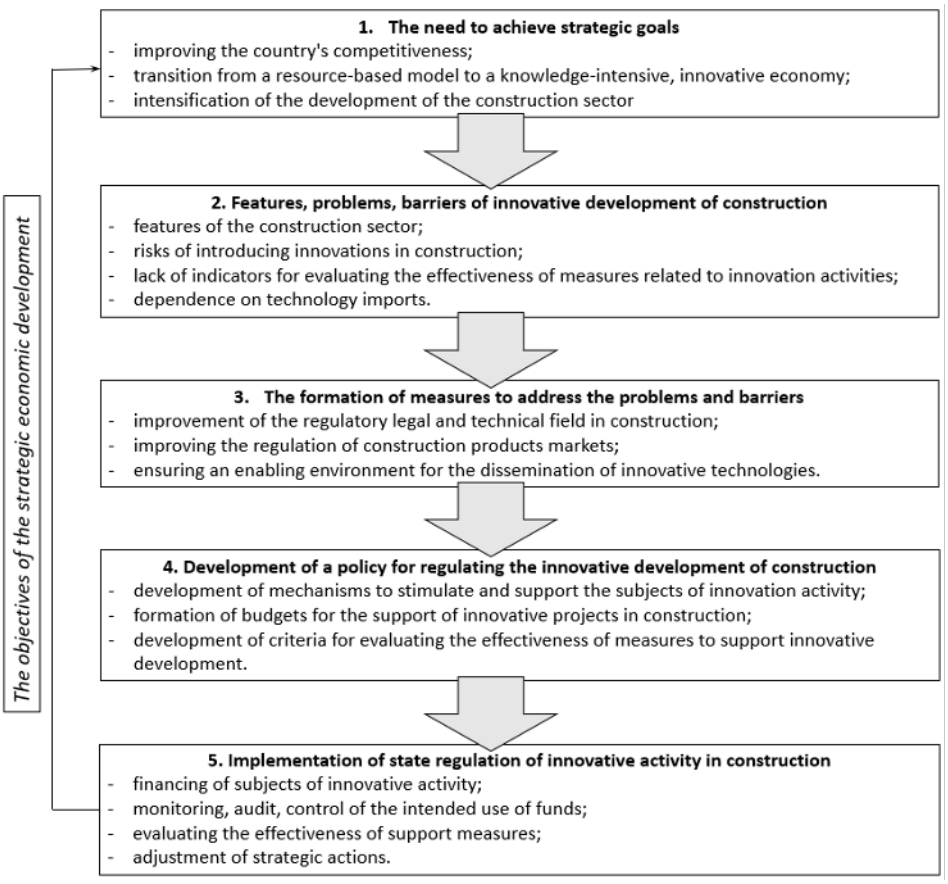

Figure 6. Mechanism of state regulation of innovation activity in construction
Source: composed by authors

It should be noted that construction is one of the most important components of the national economy. Further innovative development of construction requires a special approach due to the traditional and conservative nature of it. Intensive development of construction, more qualitative and timely construction of facilities will consequently affect the quality of life of the country's population. Favorable conditions for entities involved in the design, creation, and commercialization of innovations is essential to create and develop innovation.

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COMPETITIVE ENVIRONMENT IN HOUSING AND UTILITY INFRASTRUCTURE

Natalia G. Pletneva

St. Petersburg State University of Architecture and Civil Engineering, Russia
E-mail: pletneva_ng@mail.ru

Ksenia V. Iarkina

St. Petersburg State University of Architecture and Civil Engineering, Russia
E-mail: yarkina.ksy@mail.ru

Abstract. The presented research is determined by the presence of a number of problems in the field of housing and communal services, the solution of which depends on the competitive environment formation. The purpose of this study is to identify the features of the competitive environment formation for housing and communal services on the basis of a comprehensive analysis of factors relevant to the study area. As a result, the article proposes directions for the competitive environment formation of housing and communal services, taking into account the identified features.

Keywords: entrepreneurship, housing and communal services, competitiveness, competitive environment.

JEL codes: D41, O18, P52

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Introduction

The development of a competitive environment and improving the quality of services are being prioritized in housing and utility infrastructure in Russia in accordance with 2035 Industry Development Program. According to a poll conducted by WCIOM, 84% of Russians are not satisfied with the quality of housing and utilities services they are provided with, 37% are dissatisfied with the timing of their provision; 9% — response speed to residents' requests, 11% — repair speed) (WCIOM, 2020).

There are several ways to improve service quality. One of them is used in many industries. It is to create a competitive environment that motivates service providers to compete for consumer attention and pay close attention to service quality.

Poor competition negatively affects the housing and utilities services industry, and the effect grows stronger each year. Common problems, such as high tariffs and aging of the housing and utilities infrastructure (the deterioration of heating, electricity and water supply systems reaches 50-70%) are supplemented with the dissatisfaction of the consumers with the quality of the services provided and the lack of a real choice of the service provider.

According to the report on the state and development of the competitive environment in the markets of goods, works, and services of St. Petersburg in 2019, the largest number of appeals for consumer rights protection was related to services — 63.2% (19,647), among them, violations of housing and utilities services — 13.2% (2,582). In general, the increase in the number of appeals that year was due to an increase in the number of appeals to poor-quality provision of housing and utilities services (Report on the state and development of competition on commodity markets of St. Petersburg, 2019).

According to the data on consumers' perception and dynamics of assessment of competition between sellers of goods, works, and services in St. Petersburg, the lowest competition level was observed among the competitors in housing and utilities services, which also affects the limited choice of services. Only one out of three (31.2%) is rather or fully satisfied with the possibility to choose the services of approximately the same quality from different companies. The level of satisfaction of St. Petersburg residents with the choice of goods and services in the market of housing and utilities services is shown in Fig. 1.

Currently, despite the fact that the housing and utilities services became competitive more than 20 years ago, the mechanism of formation of a competitive business environment in this area is still not perfect, and its elements still do not show the necessary efficiency.

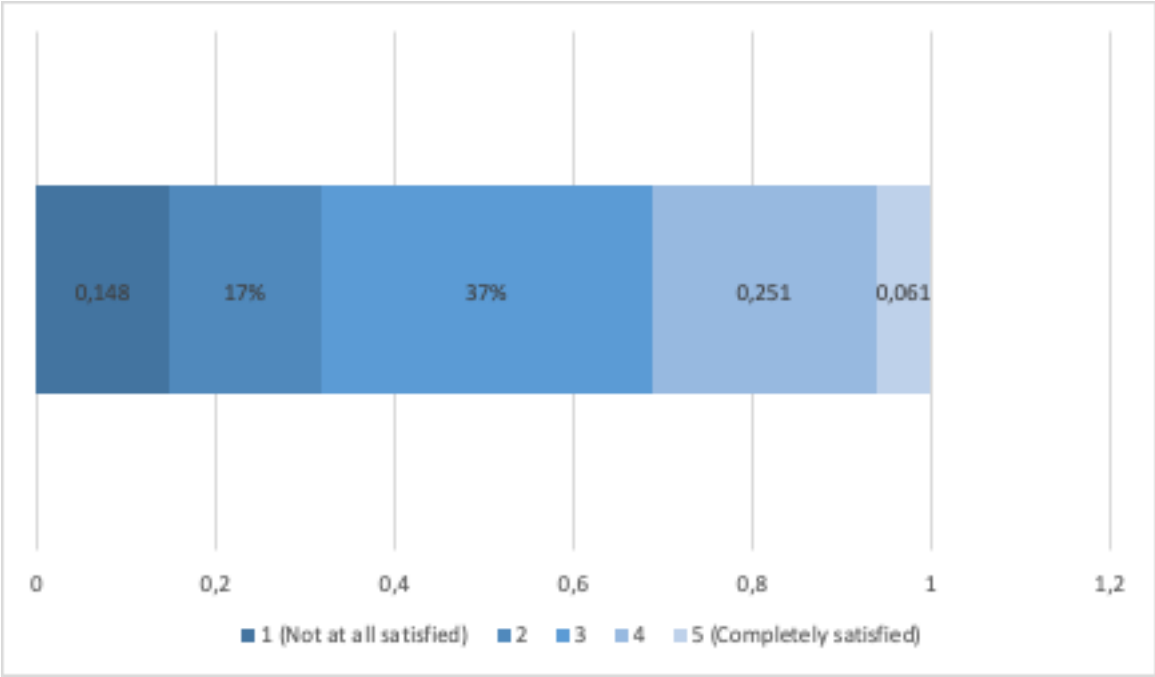

Figure 1. The level of the residents of St. Petersburg satisfaction with the opportunity to choose goods and services, based on the analysis of answers to the question "Please rate, using a five-point system, to what extent are you satisfied with the opportunity to choose goods and services on the commodity markets?"
Source: Report on the state and development of competition on commodity markets of St. Petersburg, 2019

Solving the problem of improving the mechanism of formation of the competitive environment in the housing and communal services within this study, we aim to identify the features of the competitive environment of this industry. This will further identify areas and tools for improvement.

Research grounds

The methodological basis of the study are general scientific methods based on a systematic approach: methods of scientific abstraction, analysis and synthesis, typology and systematization.

The study is based on the works of Russian and foreign researchers on the theory of competitive business environment, functioning of business structures in housing and utilities sphere: Petrova (2013); Usik (2012); Pavlova (2008); Firsenko (2002); Shurchikova (2002); Chirikhin (2017) et al.

This study continues our own research on competitiveness (2019) as the identification and analysis of the features of the competitive environment in the housing and utilities sector.

Study contents

The housing and utilities sector is developing rapidly. It has both great potential for entrepreneurial activity and significant constraints because the entrepreneurs are not able to competitively provide the fullest range of services in the housing and utilities infrastructure. In addition, conditions for the formation of a competitive business environment, where possible, are not sufficient to provide consumers with quality services.

The entrepreneurial structures of housing and utilities services are characterized by both traditional tasks of entrepreneurial activity and specific ones, which, accordingly, affect the competitive environment. To identify the features of the competitive environment in the housing and utilities sector, let us analyze the approaches to the definition of the concept of «competitive environment». In this case besides the definition itself, such factors as the subject of competitive environment and specific aspects of its formation are also of

interest.

Table 1 shows the analysis of definitions of the competitive environment in order to identify the differences and features of its formation in the housing and utilities services.

Table 1 – Analysis of approaches to the «competitive environment» definition

Approach to definition	Authors of the «competitive environment» definition	Competitive environment object	Features of the competitive environment formation
Institutional	Oiken (1995)	aggregate of regulating principles	directive nature of creating conditions for the market environment formation for deregulated sectors of the economy
	Usik (2012)	conditions of activity of market entities	directive and democratic nature of the development of institutions, allowing to control the social component of the economy
	Pylneva, Koryakin, Azarin (2008)	conditions of organizations rivalry	competitive environment as a set of competing firms that produce goods or provide services to competitors
	Shurchikova (2004)	aggregate of competitives	the competitive environment is made dependent on a number of conditions, which can be divided into several levels: the state, competitors and market participants
Marketing	Porter (2005)	aggregate of indicators of competition development	existing at a certain point in time coordination of the activities of market entities
	Petrov (2015)	aggregate of factors that enable organizations to compete	conditions that allow for the growth of production in a specific period of time
	Pavlova (2008)	aggregate of market competitive relations	the competitive environment contains conditions for the development of full-fledged competition

Approach to definition	Authors of the «competitive environment» definition	Competitive environment object	Features of the competitive environment formation
	Firsenko, Yushkova (2002)	aggregate of conditions of activity and relations of competing organizations	the determining function is the synergia of the interaction of competitive factors

Source: composed by the authors

The analysis of approaches to the definition and formation of the competitive environment allows us to conclude that the difference in approaches is significant: some researchers associate this concept with conditions that help the economic development, and some of them — directly with the situation in the markets.

The housing and utilities sector now sees institutional approach to the definition of the competitive environment as relevant. It is based on the established state regulation, which sets not only restrictions, but also objectives. Development in this case occurs through decisions at the state level. However, it is more appropriate to apply the marketing approach to the competitive environment of the housing sector. It allows us to consider the effective market position of the economic entity as a source of competitive advantage. At the same time, the development of competitive environment happens at the expense of competition of entrepreneurial structures through quality improvement, innovation activity, etc.

The analysis of these concepts allows us to give the most precise definition of the competitive environment for housing and utilities sector: competitive environment of housing and utilities services is a set of factors and conditions for coordination of organizations' activities in the market of housing services in order to achieve the best results for all stakeholders. Natural monopoly is prevalent in the market of public utilities; therefore, it excludes a competitive environment at this stage of development. Subsequently, a competitive environment based on an institutional approach is possible.

The analysis of the table shows not only the diversity of approaches to the concept of competitive environment, but also allows us to notice the presence of a rather similar term — entrepreneurial environment. For the housing and utilities services, where there are insufficient incentives for the entrepreneurship, it is important to compare the concepts of competitive and entrepreneurial environment.

Both competitive and entrepreneurial environments are a set of factors affecting the market, while having many differences. The subject of the competitive environment is not only commercial, but also non-commercial and public organizations, as well as consumers. At the same time, the entrepreneurial environment shapes the market situation in such a way that entrepreneurial structures develop and function sustainably. This also leads to a difference in the purpose of forming environments. Regulatory policies and development instruments will differ accordingly. The common and different features of the competitive and entrepreneurial environments are shown in Fig. 2.

The specific aspects of formation of the competitive environment are determined by the entrepreneurial structures functioning in it. With regard to the housing and utilities sector, they should be considered as independently operating, carrying out at their own risk legal forms of commercial entities. These are aimed at obtaining benefits through the use of property, sale of goods, works, and services on an innovative basis.

Currently, the entrepreneurial structures of housing and utilities sector are characterized by interdependence, sufficient autonomy, and great diversity. The type of activity, form of ownership, size, and nature of the organization's activity can be singled out as classification attributes. A generalized classification is presented in Table 2.

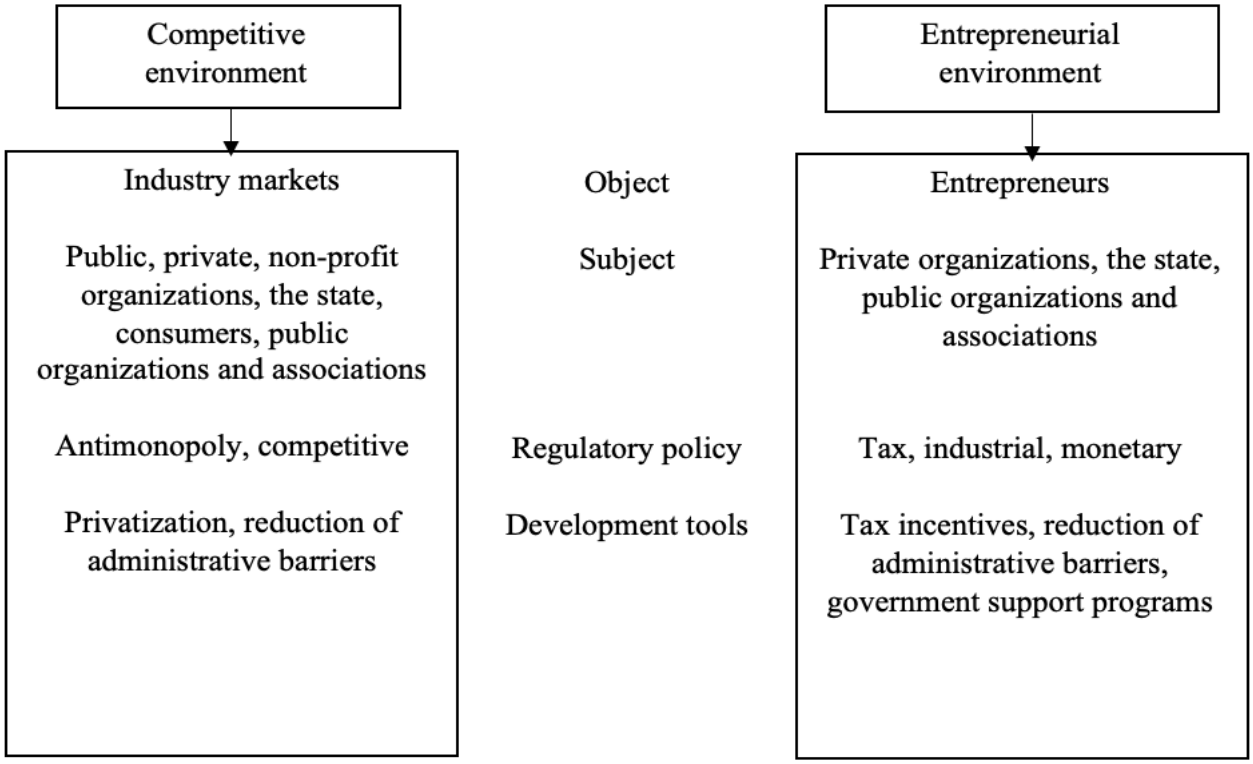

Figure 2. Characteristics of the competitive and entrepreneurial environment
Source: composed by the authors

Table 2 – Classification of entrepreneurial structures in housing and communal services

A sign of the business structures classification	Groups	Characteristic
Kind of activity (Koroleva, 2016)	Resource supplying enterprises and organizations	Production of material products (water, heat, electricity, production and consumption of which either coincide in time or follow each other. That is, enterprises cannot accumulate production, but must produce it exactly as much as is necessary in the current period)
	Housing management organizations, contracting repair and construction and maintenance enterprises and companies	Engaging in the management of common property in apartment buildings, contracting for the operation, technical and sanitary maintenance of common property, as well as the provision of other services
	Multiservice companies and organizations performing work on external improvement, landscaping, collection and disposal of municipal solid waste	Carrying out repairs (current and capital) and technical operation of elevators, garbage chutes, collection and removal of household waste, maintenance, cleaning and improvement of common areas and the local area, as well as the provision of all or certain types of utilities (electricity, heating and hot water supply, gas supply, water supply and sewerage, including wastewater treatment)

A sign of the business structures classification	Groups	Characteristic
Type of ownership	Private	Owned by an individual or a group of individuals
	State	The owner is the state represented by the relevant authorities (municipal, regional, etc.)
	Joint	Presence of a share of private and state property
Size of organization	Micro	The number of employees up to 15 people; annual revenue up to RUB 120 million.
	Small	The number of employees is from 16 to 100 people; annual revenue up to RUB 800 million
	Average	The number of employees is from 101 to 250 people; annual revenue up to RUB 2 billion.
	Large	The number of employees is over 251 people; annual revenue over RUB 2 billion.
Nature of activity (Suleymanova, Blazhevich, Karachun, 2016)	Commercial	Self-financing organizations with a goal of making a profit
	Non-profit	The company's activities are not aimed at making a profit and is aimed at performing socially significant functions: these include non-profit utilities that provide services such as landscaping, lighting, external improvement, etc. They do not have sales proceeds, but are on the estimate of the local budget

Source: composed by the authors

In addition to the specific aspects of the status of entrepreneurial structures in the housing and utilities sector, which are determined by the type, nature of activity, size of organization, and form of ownership, factors (conditions) of internal and external environment of entrepreneurial structures have a key role in the formation of competitive environment.

Factors of internal environment include production and technical, social, economic (at the organization level), information, marketing, business relations. The external environment includes economic (region and country level), legal, political, scientific and technical, communication, business and natural-climatic factors (Khil, 2015). Their combination forms the conditions for the market functioning.

Factors that determine the formation and development of a competitive business environment in the field of housing and utilities services are presented in Table 3.

Table 3 – Factors of the external and internal entrepreneurial environment in housing and communal services

External		Internal	
Legal	Open access to information	Production and technical	Innovative development
Political	Government influence		Management aspect

External		Internal	
Scientific and technical	Infrastructure	Marketing	Quality of services provided
Economic	Economic mentality	Social	Personnel potential
	Crisis phenomena	Economic	Availability of financial sources
	Energy resources cost		
Natural	Impact of the season on provision of services		

Source: composed by the authors

Before analyzing and forming the directions for the development of competitive environment, the elements of competitive environment and factors affecting it should be defined. At the same time, it is important to consider the patterns of its development.

Each business environment is characterized by certain patterns due to the economic nature of competition, which underlie the competitive process and determine the direction of competitive behavior of business entities, which in this context are invariant to the subjects of competition (Khakimov, 2019).

At the same time, the regularities of functioning of entrepreneurial structures and development of competition are manifested in the interaction at all levels of the competitive system: mega-, macro-, meso- and micro-levels (Khakimov, 2019).

It is most difficult to assess the competitive environment at the mega level due to the presence of barriers: difficulties in defining and systematizing parameters, lack of unified methodological approaches, different economic models of countries, etc. At the macroeconomic level, the competitive environment is considered within the national economy. Mesolevel - the competitive environment at the regional level. And the key level is the microeconomic level, the basis of which is the competitiveness of entrepreneurial structures, i.e., the ability to function successfully in the market. State policy underpins regulation at all levels.

In order to identify how a competitive environment of housing and utilities services is formed, it is also necessary to compare the housing and utilities services industry with other industries. We have selected similar activities related to housing and utilities services for comparison: construction and transportation. As the market for housing and utilities services includes the provision of both housing and utilities, it is advisable to specify such factors as the level of government control, types and forms of ownership of economic entities, the state of market infrastructure, the availability of financial and other resources, technology, innovation nature of demand, the nature of demand for services, market structure, the availability of information on each market separately. The results of the comparison are presented in Table 4.

The analysis of the formation of the competitive environment in construction, transport, and housing and utilities services, presented in Table 4, allows us to find the differences in the competitive environment between the reviewed markets of services provision:

- the division of the housing and utilities sector into the housing market and the utilities market affects the formation of a competitive business environment. In the market of utilities services at this stage it is difficult to develop competitive relations, forms of ownership are limited to state and municipal, and public-private partnerships. The government also controls it strictly. However, the housing services market is a promising area for the development of competition and self-organization;
- the continuous nature of the demand and the lack of opportunities for consumers to refuse services also distinguishes the sector of housing and utilities services from the rest, where the demand is discrete, and determines the special importance of the industry for the population;
- the need for housing and utilities is formed collectively in contrast to construction and transport, where it can be both collective and individual.

Table 4 – Features of the formation of a competitive environment in the housing and communal,

construction and transport sectors

Factor	Housing and communal services		Construction sector	Transport sector
	Housing services market	Utilities market		
Government control level	Public administration at all levels, self-organization	Rigid government control at all levels	Self-organization, public administration	Self-organization, public administration
Types and forms of ownership of business entities	All forms of ownership	State and municipal property, public-private partnership	All forms of ownership	All forms of ownership
Market infrastructure condition	Large volume of new commissioning and the presence of high-level emergency housing stock	High wear and tear of production facilities	Satisfactory condition of the construction infrastructure	The state of the backbone transport network does not correspond to the existing and future cargo and passenger flows
Availability of financial and other resources, technologies, innovations	Providing state financial support, development within the framework of the digitalization of the economy	Direct budget financing, provision of state financial support, development within the framework of the digitalization of the economy	Providing state financial support, development within the framework of the digitalization of the economy	Providing state financial support, development within the framework of the digitalization of the economy
Nature of demand	Continuous nature of demand, there is a choice of some services (except for those that are required)	The continuous nature of demand and the inability of consumers to refuse services	Discrete demand, there is an opportunity to refuse services	Discrete demand, there is an opportunity to refuse services
The nature of the formation of the need for services	Collective	Collective	Individual, collective	Individual, collective
Market structure	Monopolistic competition	Natural intra-industry monopoly	Monopolistic and pure competition	Oligopoly, monopolistic and pure competition (by mode of transport)

Factor	Housing and communal services		Construction sector	Transport sector
	Housing services market	Utilities market		
Availability of information	Information in the public domain on the website of the State Information System of Housing and Communal Services	Information in the public domain on the website of the State Information System of Housing and Communal Services	Information in the public domain on the website of the Federal State Statistics Service	Information in the public domain on the website of the Federal State Statistics Service

Source: composed by the authors

Results and conclusions

The analysis of scientific approaches allowed us to determine the need to take into account the specifics of the sector in the development of a mechanism for the formation of a competitive business environment: division of services into sectors where formation of competitive environment is possible (housing services) and where formation of competitive environment is impossible (utilities services), special importance and mandatory nature of services for the population, strict state regulation, availability of territorial binding of housing and utilities infrastructure.

At the same time, at the moment, the entrepreneurship and its competitive environment in this area are developed due to forming the regulatory framework of business structures of housing and utilities services, implementing the process of privatization of municipal property, forming business structures as public-private partnerships, as well as forming new private structures: associations of homeowners, managing, operating, and servicing organizations and their associations; developing small and medium-sized businesses, developing competitive relations among the subjects of the housing and utilities services market and promoting the role of the population as a homeowner and a subject of the housing and utilities services market.

This shows the need and feasibility of development and implementation of marketing approach to the formation of a competitive environment and customer satisfaction management methods in the formation of market mechanisms of housing and communal services, as well as the formation of a system of feedback from consumers and comparative analysis of business structures on indicators of customer satisfaction and loyalty.

An important direction is also the creation of a comprehensive approach in order to assess the quality of housing and communal services at the level of self-regulatory organizations, identifying gaps «expectation - perception» and making decisions to terminate contracts and impose obligations on companies that do not properly fulfill their obligations. A competitive business environment should act as a stimulus to develop a client-oriented approach to housing and utilities services aimed at understanding clients' needs and improving the efficiency of work with them.

Thus, the competitive entrepreneurial environment of housing and utilities services in the modern economy is the ability to combine and structure the potential of organizations, their advantages, market positions and tools to influence the environment of functioning to improve its level in qualitative and quantitative measurements.

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