

Formation of a system of indicators of balanced economic development in the context of globalization: space-time analysis in order to ensure economic security

Lubov Afanasyeva^{1,*}, Larisa Belousova¹, and Tatyana Tkacheva¹

¹Southwest State University, Faculty of Economics and Management, Department of Economic Security and Taxation, Kursk, 50 Let Oktyabrya Street, 94, Russia

Abstract.

Research background: The modern world economy of the 21st century, being innovatively oriented, global and based on the information space, is constantly being modified, focusing on the growth of the level and quality of life of the population by accelerating innovation processes. For the purposes of monitoring the innovation and investment activities of the regions in order to ensure the economic security of Russia, it is necessary to have a system of indicators that reflect the processes of innovative development of its territories as comprehensively as possible.

Purpose of the article: Formation of a system of indicators for the balanced development of the region's economy in the context of globalization: space-time analysis in order to ensure economic security.

Methods: Spatio-temporal analysis of the identified indicators of balanced development of the regional economy in order to ensure economic security.

Findings & Value added: The proposed system of indicators of economic security of the region and their threshold values can be used in assessing the development forecasts of the regions and the Federal Districts developed by the administration, draft budgets, expertise of the federal target programs, as well as in other elements of the regional economic security management.

Keywords: *max economic growth; economic security; thresholds; indicators of innovation and investment activity; spatial and temporal analysis*

JEL Classification: *P47; O32; O49*

* Corresponding author: lv_af@mail.ru

1 Introduction

For the purpose of monitoring innovation and investment activity in the context of globalization in the aspect of Russia's economic security, it is necessary to have a system of indicators that most comprehensively reflect the processes of innovative development of its territories. It should be noted that approaches to the formation of a balanced system of indicators of the economic security of the region in Russia and abroad differ. Currently, in the European Union, in connection with the implementation of the Europe Development Strategy 2020, regional innovative development strategies are being revised. In this regard, a new "template" was developed for building such strategies - "Smart Specialization" (Smart Specialization Platform). One of its features is the integration of monitoring and evaluation mechanisms used in Regional Innovation Strategies (RIS) and Action Plans. The specificity of regional strategies for innovative development lies in the fact that in most cases target indicators are not presented in them. The European practice of including target indicators in such documents began recently and not all government documents have been updated.

Many European regional strategies for innovative development do not include a list of indicators, as is done in Russia. In most cases, these documents contain a descriptive part, analytical calculations confirming the need for changes in the innovation sphere, setting goals and objectives to achieve specific values, as well as a list of tools necessary for the implementation.

Regional strategies for innovative development, which contain target indicators, imply the compilation of a list of indicators for each of the planned activities. In this case, as a rule, not only indicators are used to assess the final result, but also indicators to assess the intermediate stages of the implementation of planned activities. However, it is difficult to call them sufficient and complete.

Thus, today there is no single system of balanced indicators of the innovation and investment component of economic security and there is also no single approach to the formation of their threshold values.

2 Literature review

In modern conditions of globalization, in order to form an economy of an innovative type, it is necessary to activate and improve the efficiency of innovation activity, to apply modern financial instruments that facilitate the withdrawal of small business as the most innovative and active sector from the shadow zone of the economy, as well as to ensure a favourable investment climate, etc. viewed by scientists from various points of view.

Thus, the authors of [1] synthesize various research perspectives into a comprehensive multi-dimensional framework of organizational innovation - linking leadership, innovation as a process, and innovation as an outcome. In the study [2] present a coherent perspective on the theory, tracing its intellectual history as it has evolved from a descriptive account of responses to technology change to a normative theory of innovation and competitive response.

An interesting approach [3], for assessing the intensity of innovation in agriculture, based on the ratio of investment efforts and the associated dynamics of labour productivity. Researchers [4] have identified some of the key factors affecting investment processes in mechanical engineering (labour force qualifications, production volume, dynamics of demand for the industry's products, the level of innovation activity within the industry, etc.). The works [5, 6] analyse some financial, tax, information, communication, infrastructural, technological and organizational mechanisms for promoting innovation in the context of the transition to the digital economy.

The study of the influence of the shadow economy on economic processes in the context of globalization is especially urgent [7-9]. The phenomenon of convergence is a serious problem for the traditional business model [10], but it is also a threat for companies that will not be able to use convergence.

An applied study of the processes of ensuring economic security in the fiscal sphere is shown in [11-13]. Sustainable development of the economy and the management of innovation are closely related to the assessment of environmental and economic factors [14-17].

Despite a wide range of studies of various aspects of innovation, questions remain about the system of indicators of economic security and their threshold values, which can be used in assessing the development forecasts of regions and Federal Districts, budget projects, expertise of Federal target programs, as well as in other elements of regional management of economic security.

3 Results

Let's analyse the indicators of innovative activity of the federal districts of the Russian Federation. The first indicator is the number of organizations that carried out research and development - table 1. Research and development is a creative activity carried out on a systematic basis with the aim of increasing the amount of scientific knowledge, including about man, nature and society, as well as finding new fields of application this knowledge. The recommended increase in this indicator over the previous year should be at least 15%.

Table 1. The number of organizations that carried out research and development, % of the previous year (A1)

Name	Change,%			
	2015/2014	2016/2015	2017/2016	2018/2017
Central Federal District	116	95,9	98,9	99,7
North-West Federal District	105,8	100,2	96,4	101,5
South Federal District	131,6	90,8	98,7	98,3
North-Caucasus Federal district	138,5	98,8	99,5	95,6
Volga Federal District	115,5	96,4	96,2	100,3
Ural Federal District	115	94,2	95,7	100,4
Siberian Federal District	115,8	98	97,5	95,5
Far Eastern Federal District	105,9	101,7	99,5	118,7

Source: [18]

According to Table 1, it can be seen that the threshold value of the indicator was reached in all districts only in 2015, except for the North-western and Far Eastern Federal Districts. In subsequent years, the indicator shows a decline and deviation from the norm by an average of 15%. Only one district, namely the Far East, managed to increase the number of organizations over the period under review, overtake all districts and reach the threshold in 2018 by 2017. In other regions, as well as throughout the country, there are not enough organizations that carried out research and development for a high level of development of innovative and investment activities.

The next indicator of balanced development of personnel engaged in research and development is a set of persons whose creative activities, carried out on a systematic basis, are aimed at increasing and searching for new areas of application of knowledge, as well as those engaged in the provision of direct services related to the implementation of research and development (Table 2). The recommended value for this indicator is at least 10% compared to the previous year.

Table 2. The number of personnel engaged in research and development, % of the previous year (A2)

Name	Change,%			
	2015/2014	2016/2015	2017/2016	2018/2017
Central Federal District	99,76	97,94	97,36	94,33
North-West Federal District	101,38	96,99	99,38	99,04
South Federal District	108,3	92,97	96,11	98,18
North-Caucasus Federal district	113,47	101,78	94,54	97,07
Volga Federal District	100,02	96,87	100,56	100,03
Ural Federal District	103,24	99,87	97,48	97,3
Siberian Federal District	101,84	100,25	97,66	97,15
Far Eastern Federal District	103,64	96,4	95,52	112,28

Source: [18]

The tendency of a decrease in the number of scientific personnel in almost every district by an average of 4-5% continues. This is not critically dangerous for innovation and investment in terms of economic security, but in order to increase the pace of development, it is necessary to direct all efforts to reach the threshold in the near future. In two districts, Privolzhsky and Far East, there is an increase. However, in the Volga Federal District, the indicator does not correspond to the given threshold value, which is a negative factor that hinders the balanced development of innovation and investment activities. In the Far Eastern District, the indicator exceeds the recommended value by 2%, setting a positive trend for innovation and investment development.

In table 3, we will consider the volume of internal costs for research and development carried out by organizations' own resources, including current and capital costs, during the reporting year, regardless of the source of funding (table 3). The threshold value for this indicator is an increase over the previous year of at least 30%.

Table 3. The volume of internal costs for research and development, % of the previous year (A3)

Name	Change,%			
	2015/2014	2016/2015	2017/2016	2018/2017
Central Federal District	107,9	101,7	108	98,9
North-West Federal District	108,1	103	105,7	102,5
South Federal District	88,7	96,6	97,7	103,2
North-Caucasus Federal district	102,4	102,3	104,5	113
Volga Federal District	109	107	109,3	102
Ural Federal District	113,5	115	111,9	96,8
Siberian Federal District	110,1	99,5	105,9	113,7
Far Eastern Federal District	110,9	100	125	97,9

Source: [18]

According to the data in Table 3, it can be seen that during the period under consideration, the threshold value was never reached. There is a significant deviation from the threshold by an average of 25%. Also, in three districts, Central, Ural and Far Eastern, in 2018 by 2017, there is a decrease in domestic spending on research and development. The analysis shows that there are threats to economic security in the field of balanced development of innovation and investment activities, as well as the need to restructure expenditure items and increase funds for research and development.

The amount of developed advanced production technologies depends on the amount of research and development costs - these are technologies and technological processes (including equipment necessary for their implementation), controlled by a computer or based on microelectronics and used in the design, production or processing of products

(goods and services) - Table 4. The recommended value of the increase over the previous year is not less than 45%.

Table 4. The number of developed advanced production technologies, % to the previous year (A4)

Name	Change,%			
	2015/2014	2016/2015	2017/2016	2018/2017
Central Federal District	120,5	104,1	89,2	110,4
North-West Federal District	78,9	101,7	86,2	89,3
South Federal District	165,8	120,6	103,9	143
North-Caucasus Federal district	85,2	65,2	153,3	130,4
Volga Federal District	83,8	117,2	81	116,8
Ural Federal District	112,1	124,5	92,9	114,4
Siberian Federal District	78,9	114,4	115,5	110,9
Far Eastern Federal District	75,7	107,1	110	127,3

Source: [18]

According to Table 4, it can be seen that in recent years, Russian organizations are increasingly actively developing advanced production technologies that allow them to optimize production processes and significantly increase labour productivity and the quality of products. In 2018 by 2017, the most productive are the Southern Federal District - 2% behind the threshold, the North Caucasus - 14.6% behind the threshold and the Far East - 17.7%. In the rest of the districts, as well as throughout the country, there is a critical lag from the recommended value of up to 55%.

Technological innovation is the end result of innovation, embodied in the form of a new or improved product or service introduced on the market, a new or improved process or method of production (transfer) of services used in practice. The costs of technological innovation are the actual costs expressed in monetary terms associated with the implementation of various types of innovation activities carried out on the scale of the organization (industry, region, country). Consider the changes in the indicator in Table 5. The recommended value for this indicator is at least 30% compared to the previous year.

Table 5. Costs for technological innovation as a percentage of the total volume of goods shipped, work performed, services, % of the previous year (A5)

Name	Change,%			
	2015/2014	2016/2015	2017/2016	2018/2017
Central Federal District	106,1	105,7	75,7	92,9
North-West Federal District	71,4	113,3	117,6	80
South Federal District	100	74,2	108,7	44
North-Caucasus Federal district	48,1	107,7	107,1	53,3
Volga Federal District	82,1	81,3	119,2	96,8
Ural Federal District	88,2	120	105,6	63,2
Siberian Federal District	89,7	65,4	111,8	110,5
Far Eastern Federal District	89,7	96,2	96	87,5

Source: [18]

According to the data in Table 5, it can be seen that in the analysed period, there is generally a downward trend. The value of this indicator in no region does not correspond to the threshold value, but on the contrary, in all but one, in 2018 by 2017 there is a decrease from 3 to 56%. The maximum in the Southern District is 56%, and the minimum in the Volga District is 3.2%. Only in the Siberian District there is an increase of 10.5%, but it is not enough for the balanced development of innovation and investment activities.

The final indicator characterizing innovation and investment activity in the aspect of the economic security of the region is the volume of innovative goods, works and services - Table 6. Innovative goods, works, services are goods, works, services that are new or that have been exposed to different degrees of technological innovation over the past three years changes. The increase over the previous year must be at least 50%.

Table 6. Volume of innovative goods, works, services, in % of the previous year (A6)

Name	Change,%			
	2015/2014	2016/2015	2017/2016	2018/2017
Central Federal District	136,7	112,5	66,8	105,5
North-West Federal District	106,1	89,8	136,1	106,3
South Federal District	144,9	165,4	123,4	68,2
North-Caucasus Federal district	147,9	89,4	93,8	117
Volga Federal District	101,6	118,3	101,9	123
Ural Federal District	127,7	168,1	139,6	103,7
Siberian Federal District	123,6	91,5	98,1	85,3
Far Eastern Federal District	32,7	55,5	110,2	124,8

Source: [18]

During the period under review, in 2016 to 2015, there is a significant surge in the volume of innovative goods, works, services - in two districts, South and Ural, the threshold value was reached. However, since 2017, there has been a tendency towards a reduction in the volume of innovative goods, works and services. In 2018 to 2017, a significant reduction in the Southern and Siberian districts is explained by a decrease in their innovative potential, in other regions there is a noticeable increase, but the threshold value is not reached in any of them.

4 Discussion and conclusion

Thus, we will form a system of indicators of balanced economic development in the context of globalization based on space-time analysis in order to ensure economic security (Fig. 1)

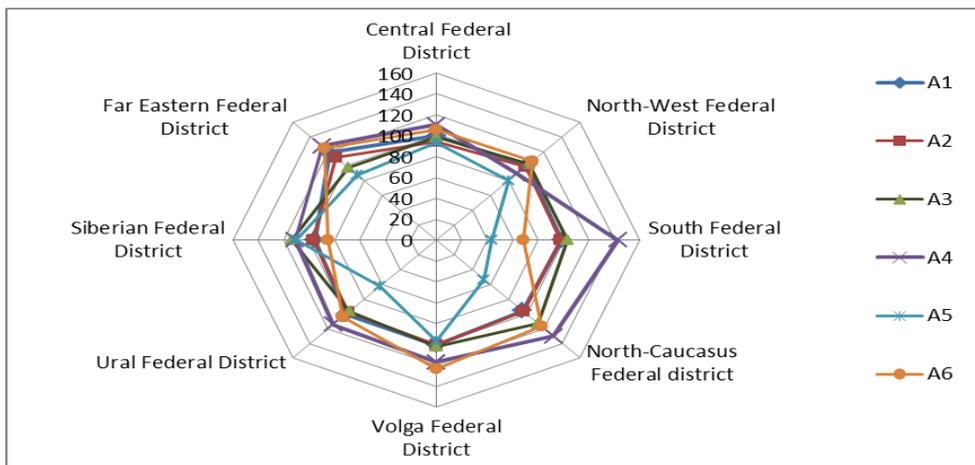


Fig. 1. Dynamics of the system of indicators of innovation and investment development of the economy in 2018 compared to 2017

During the formation of the system of indicators of innovation and investment activity in the space-time context in the context of economic security, the following problems were identified:

1. low activity of entrepreneurship in the innovation sphere, which is explained by the high riskiness of investment and the uncertainty of the payback period. Entrepreneurs do not want to engage in innovative activities due to the high riskiness of business and the lack of demand for innovations, as well as due to the lack of sufficient support for innovation from the state, which is typical for developed countries;
2. staffing problem: insufficient number of experienced employees able to promote innovation to the market;
3. lack of funding: lack of funding in full increases the time for the implementation of competitive projects, reducing the quality of innovation. Enterprises do not have their own funds to finance developments, and the possibility of attracting funds from external sources is limited.

A system of indicators of balanced innovation and investment development in the aspect of economic security has been formed and analysed. The proposed system of indicators of economic security can be used in assessing the forecasts for the development of regions and Federal Districts developed by administrations, draft budgets, expert examination of Federal target programs, as well as in other elements of regional management of economic security in the context of global economic development.

This research was conducted with the support of the Ministry of Science and Education of Russia within the framework of the project under Agreement No. 0851-2020-0034.

References

1. Crossan M. M., Apaydin M. (2020). A Multi- Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies*, 47(6), 1154-1191.
2. Clayton M. Christensen, Rory McDonald, Elizabeth J. Altman, Jonathan E. Palmer (2018). Disruptive Innovation: An Intellectual History and Directions for Future Research. *Journal of Management Studies*, 55(7), 1043-1078.
3. Kheyfets B. A., Chernova V. Y. (2019). Sustainable agriculture in Russia: research on the dynamics of innovation activity and labor productivity. *Entrepreneurship and Sustainability Issues*, 7(2), 814-824.
4. Pogodina T. V., Aleksakhina V. G., Burenin V. A., Polianova T. N.; Yunusov L. A. (2019). Towards the innovation-focused industry development in a climate of digitalization: the case of Russia. *Entrepreneurship and Sustainability Issues*, 6(4), 1897-1906.
5. Veselovsky M. Y., Pogodina T. V., Ilyukhina R. V., Sigunova T. A., Kuzovleva N. F. (2018). Financial and economic mechanisms of promoting innovative activity in the context of the digital economy formation. *Entrepreneurship and Sustainability Issues*, 5(3), 672- 681.
6. Sevriukova L. V., Trusova N. C. (2014). State policy to promote investment activity in regions. *Economic Annals-XXI*, 9-10, 106-107.
7. Tsiklauri V. Y., Devyatilova A. I., Artemov R. V., Markina S. A. (2017). Shadow globalization as a threat to world economic growth. In K. S. Soliman (Ed.), *Education Excellence and Innovation Management through Vision 2020 From Regional Development Sustainability to Global Economic Growth: Proceedings of the 29th*

- International Business Information Management Association Conference* (pp. 2478-2489). Vienna.
8. Klimenko P., Markina S., Mashkina N. (2017). The influence of processes of financial globalization and transformation on the word financial and credit system. *SGEM International Multidisciplinary Scientific Conference on Social sciences and Arts* (pp. 847). Albena: International Multidisciplinary Scientific GeoConferences.
 9. Tsiklauri V., Sevryukova L., Devyatilova A., Belousova S. (2019). Bankruptcy of enterprises as an indicator of disturbance of sustainable economic development. In K. S. Soliman (Ed.), *Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020. 33, Education Excellence and Innovation Management through Vision 2020* (pp. 2395-2403). Granada.
 10. Grubicka J., Matuska E. (2015). Sustainable entrepreneurship in conditions of UN (Safety) and technological convergence. *Entrepreneurship and Sustainability Issues*, 2(4), 188–197.
 11. Tkacheva T. Y., Sevryukova L. V., Afanasyeva L. V. (2016). Organizational and Functional Features of Fiscal Mechanisms: Theoretical Aspects and Current Trends. *The Social Sciences*, 11(15), 3692-3696.
 12. Tkacheva T. Y., Afanasjeva L. V., Sevrukova L. V., Goncharenko L. I., Panskov V.G. (2019). Formation of modern fiscal mechanisms: integrated approach. In K. S. Soliman (Ed.), *Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020. 33, Education Excellence and Innovation Management through Vision 2020* (pp. 9578-9582). Granada.
 13. Sevryukova L., Belousova S. (2016). Trends in taxation of personal income: Russian and foreign experience. *Economic Annals-XXI*, 157, 3-4(1), 41-43.
 14. Kirilchuk I., Rykunova V., Panskov V. (2018). Indicators of sustainable development as indicators of ecological-economic safety. *18th International Multidisciplinary Scientific GeoConferences SGEM 2018. Conference proceedings* (pp. 491-498). Albena.
 15. Rykunova V., Goncharenko L., Belousova S. (2017) Enhancement of the incentive function of economic mechanism for rational natural resources management. *17th International Multidisciplinary Scientific Geoconference Sgem* (pp. 285-292). Vienna.
 16. Kirilchuk I., Rykunova V., Panskov V. (2018). Features of calculation and analysis of ekology- economic index of the region on the example of kursk region. *18th International Multidisciplinary Scientific GeoConferences SGEM 2018. Conference proceedings* (pp. 375-382). Albena.
 17. Kirilchuk I., Rykunova V. (2019). Unauthorized dumps: socio-economic aspects of the problem. *Economic Annals-XXI*, 180(11-12), 165-172.
 18. Federal State Statistic Service (2020). *Russia in digits*. Retrieved from : <https://rosstat.gov.ru/folder/210/document/12993>