

Methodology for Assessing the Innovative Component of the Region's Financial and Budgetary Security of the Region (Case Study of the Komi Republic)

E. Karanina*, M. Kzyurov

Vyatka State University, Kirov, Russia

*Corresponding author. Email: kafinanc@yandex.ru

ABSTRACT

The purpose of the study is to formulate a methodological approach to monitoring the innovative component of the financial and budgetary security of the Komi Republic. The research objectives are: examine the actual approaches to evaluation the innovative component of financial and budgetary security; to develop on their basis a methodology for assessing the innovative component of the financial and budgetary security of the region; develop a list of indicators for assessing threats to innovative security; to test the proposed methodology by the case of the Komi Republic. The following methods were used: indicative method, comparison method, analysis, and synthesis. The article provides a brief description of approaches to assessing innovative security and presents the author's approach to evaluation the innovative component of the financial and budgetary security of regions. A list of indicators of innovative security and threshold values are developed. It is proposed to evaluate the state of the region's innovation sphere to identify and determine the degree of danger of security threats relying on these indicators. The proposed methodology was tested by the case of the Komi Republic and can later be used by government agencies when they evaluate the state of the financial sector in the region.

Keywords: financial and budgetary security, innovation, innovative security, region, Republic of Komi, indicators, threats.

1. INTRODUCTION

The most significant constituent part of economic security is financial and budgetary security. Thanks to the financial system, the movement and distribution of financial resources between various participants in economic relations is carried out, it is through the financial mechanism that the government ensures the fulfillment of its functions and tasks (Simion, Stanciu, Armășel, 2015). Since Russia is a federal state where there are two levels of state power, the level of financial and budgetary security of our country depends on the financial condition of its regions which predetermines the importance of studying security issues at the regional level.

An important element of financial and budgetary security is the innovation component. J. Chen considers innovation as a central process that stimulates economic growth and competitiveness of both individual companies and countries (Chen, 2017). A developed innovation environment is the main condition

for the region's long-term competitiveness and sustainable development (Mikhaylov, Mikhaylova, Savchina, 2018), a factor in increasing the employment level of the region's population (Szopik-Depczyńska, Kędzierska-Szczepaniak, Szczepaniak, Cheba, Gajda, Ioppolo, 2018). J. Fagerberg also writes about the decisive role of innovation in economic development (Fagerberg, 2017). Z.J Acs, D.B Audretsch, E.E Lehmann, G. Licht point out that today comprehension of the significance of innovation for economic development exists in both developed and developing countries. Politicians of developed countries consider innovation to be the most important trigger of economic development (Acs, Audretsch, Lehmann, Licht, 2017). One of the main threats to the security of the region is the decline in the region's competitiveness in international and national markets as a result of its lag in the speed of mastering new technologies. Improving the level of financial security is a significant condition for the initial and technological development of Russia and its regions.

The question about the innovative component of the financial and budgetary security of the region currently is not thoroughly studied in the scientific literature at the present time. Most authors consider innovative security either as an integral part of economic security (Golova, Sukhovey, 2017; Leschenko, 2019), or as an element of technological security (Vishnevskaya, Sviyazov, 2018), or as a separate type of security (Kim, 2014). There are various approaches to the essence of the concepts of "innovation" and "innovative security". For example, F. Gault believes that innovation is "the introduction of a new or significantly improved product, goods, service, process, new method" (Gault, 2018). M. Edwards-Schachter similarly defines innovation as a process and result of creation or invention of something new and valuable (Edwards-Schachter, 2018). According to I.M. Golova and A.F. Sukhovey, innovative safety is a set of subjects of innovation and effective technical and technological, managerial, infrastructural and other resources and factors aimed at increasing the efficiency of innovation processes, which are the basis of modern socio-economic development and growth of countries and regions (Golova, Sukhovey, 2017).

In our opinion, innovation security can also be considered as an integral element of financial and budgetary security, since the level of innovative development is the most important condition for the competitiveness of the region's economy, which is a necessary condition for the financial well-being of both an individual subject of Russia and the entire country. Consequently, the way the entire financial and budgetary system of the state or region will function depends on how effectively the system for ensuring innovative security works. Therefore, the state must timely identify emerging threats and risks in the field of innovation, eliminate the causes and negative factors that generate them even before they begin to have a destructive effect on the economy. In connection with the above, a fundamentally important task is to create a mechanism for monitoring and diagnosing threats to the innovative component of financial and budgetary security.

2. MATERIALS AND METHODS

A prerequisite for ensuring the innovative component of financial and budgetary security is an accurate assessment, identification and timely identification of threats to innovative security. Timely identification of negative factors and security threats creates an opportunity to timely eliminate their negative impact on financial security before the threat is realized. Consequently, an important structural element of the mechanism for ensuring innovative security is monitoring, which makes it possible to identify both real, existing, and potential threats to the innovative security of the region.

In the scientific literature, there are various methods for assessing and innovative security. Here are some of the most interesting ones.

I.M. Golova and A.F. Sukhovey propose to use a rating approach to assess the innovative component of regional security, based on the ranking of regions by a sub-index characterizing the level of development of scientific research development, including indicators such as "the number of people employed in R&D", "R&D costs", "number of patents", "presence of scientific organizations" and a sub-index characterizing the development of the high-tech sector of the economy in the region based on the use of the following indicators: output of high-tech and medium-tech, high-tech industries and the contribution of these production sectors to the total output and employment of the region's population. The final index is calculated as arithmetic mean of the above two sub-indices (Golova, Sukhovey, 2018).

In another article, I.M. Golova, A.F. Sukhovey and N.L. Nikulina use an indicative method to assess innovative security. The authors subdivide indicators of innovative security into 6 blocks:

1. Human potential;
2. Innovation potential;
3. Logistics;
4. Ability and ability to generate knowledge;
5. Adaptation in the information society;
6. Innovative competitiveness of the region.

Further, using indicators, an assessment of the dynamics of the values of indicators by region is carried out, and using the normalization of values and their aggregation, the general level of innovative security and the assignment of a region to a particular hazard zone is determined (Golova, Sukhovey, Nikulina, 2017).

T.V. Ponomarenko, O.V. Prokopenko, M.A. Slatvinskyi, N.V. Biloshkurska, M.V. Biloshkursky, V.A. Omelyanenko propose to consider the innovative component of the financial security of the region in an inextricable connection with the investment component and identify 5 indicators for assessing innovative development at the state level:

1. capital investment;
2. capital investments financed from state and local budgets;
3. foreign direct investment (capital);
4. costs for scientific and technical work;
5. "share of research and development costs in GRP".

Further, the actual values are normalized according to the indicators, then the researchers, using an expert method, propose to establish the weighting coefficients of the indicators to define the general level of safety. The final safety level is determined using the geometric mean of the indicators (Ponomarenko, Prokopenko, Slatvinskyi, Biloshkurska, Biloshkursky, Omelyanenko, 2019; Prokopenko, Slatvinskyi, Biloshkurska, Biloshkursky, Omelyanenko, 2019)

J.V. Narolina, T.V. Sabetova, N.V. Shabutskaya,

N.V. Gryshchenko propose to assess the innovative security of the region using six indicators:

1. the ratio of scientific, research organizations and design bureaus to the total number of enterprises and organizations in the region, %;
2. the share of people working at research organizations in the total number of people employed in the region, %;
3. the proportion of researchers with scientific degrees among employees of scientific organizations, including those directly involved in research, and the proportion of such people among the total number of the region population;
4. the patents' number received for invention-models and utility models, the number of new technologies created in the region; total costs for research and development in GRP, %, per 1 employee, per 1 scientific organization;
5. the share of innovative goods, works and services in the total volume of shipped goods, performed works of services, %;
6. the number and proportion of businesses selling, purchasing, using new technologies, and assisting in their application.

Using the analysis of each indicator, threats to the innovative security of the region are identified (Narolina, Sabetova, Shabutskaya, Gryshchenko, 2019).

The most accurate way to diagnose threats to the innovative component of the region's financial and budgetary security is an indicative approach, which involves identifying security threats by comparing the actual values of indicators with threshold values. The advantage of the approach is its ease of use in comparison with the methods of applied mathematics and high accuracy and objectivity in comparison with the expert method for assessing innovative security (Karanina, Kyzyurov, 2020). To overcome the difficulties associated with the large heterogeneity of indicators of innovative security, it is also advisable to use the method of bringing the actual indicators' values to normalized using a 100-point scale. In addition to the threshold indicators' values, it is proposed to use the upper and lower safety thresholds for calculating the

normalized values. The upper threshold is equal to the value of the indicator at which the maximum possible level of safety is ensured, the lower threshold corresponds to the level at which even the minimum level of safety is not provided.

To calculate the scores for the indicators, the following formula was used:

$$\text{If } A \in [A_{\min}; A_{\max}] \tag{1}$$

$$A_{\text{norm}} = (A - A_{\min}) / (A_{\max} - A_{\min}) * 99 + 1 \tag{1};$$

$$\text{If } A > A_{\max}; A_{\text{norm}} = 100 \tag{2}$$

$$\text{If } A < A_{\min}; A_{\text{norm}} = 1; \text{ where} \tag{3}$$

$$A_{\text{norm}} = A_{\text{threshold}} * 1.2 \tag{4}$$

$$A_{\min} = A_{\max} * 0.2 \tag{5}$$

A is initial indicator.

A_{threshold} is the indicator's threshold value of the.

The method was approved on the instance of the Komi Republic. For the diagnosis of innovative security, seven indicators were selected, and threshold values of indicators were developed.

Table 1. Threshold values of indicators of the innovative component of the financial and budgetary security

Indicator	Threshold value
The share of innovative products in the total volume of industrial production, %.	25
The number of people engaged in research and development per 10,000 employed population, people	120
Internal costs of research and development to GRP, %	2.2
Intensity of costs for technological innovation, %	3.2
The share of high-tech and knowledge-intensive industries in the gross regional product	25
Number of applications filed for inventions and utility models per 10,000 population, units	5
Labor productivity index, %	106.5

The calculation of the values of the indicators was carried out using the official data of Rosstat. The indicators were calculated using MS Excel.

3. RESULTS AND DISCUSSION

During the approbation, the safety level was assessed, the values of the indicators were converted into points using the normalizing function. Then, using the arithmetic mean, the general level of the innovative component of the financial and budgetary security of the Komi Republic was determined.

Table 2 shows the statistical data of Rosstat for the Komi Republic used for the calculation.

Table 2. Actual values of indicators of the Republic of Komi used to calculate indicators of security

Indicator	Value
The share of innovative products in the total volume of industrial production, %.	1.6
Number of personnel engaged in research and development, people	1,447
Average annual number of employed, thousand people	401
Population as of January 1, 2019	830,235
The number of people engaged in research and development per 10,000 employed population, people	36
Internal expenses on scientific research and development, mln. rub.	1,953.8
GRP, million rubles	720,665.3
Internal costs of research and development to GRP, %	0.27
Intensity of costs for technological innovation, %	0.9
The share of high-tech and knowledge-intensive industries in the gross regional product	11
Receipt of patent applications	81
Number of applications filed for inventions and utility models per 10,000 population, units	1
Labor productivity index, %	102.7

Based on the values, a point assessment of the Komi Republic was carried out, the results of which are reflected in Table 3.

Table 3. Point assessment of the innovative component of the financial and budgetary security of the Komi

Indicator	Score
The share of innovative products in the total volume of industrial production, %.	1
The number of people engaged in research and development per 10000 employed population, people	11
Internal costs of research and development to GRP, %	1
Intensity of costs for technological innovation, %	9
The share of high-tech and knowledge-intensive industries in the gross regional product	25
Number of applications filed for inventions and utility models per 10 000 population, units	1
Labor productivity index, %	22
Total score	10

At the last stage of the assessment, after calculating the points for the final indicator, using the zone methodology, the general level of the innovative component of financial and budgetary security is determined, then security threats are identified.

Table 4 shows the security zones of the financial and budgetary security of the region and the range of points corresponding to each of the zones.

Table 4. Security zones of the region

Security zone	Number of points
High level of security	90-100
Stability	80-89
Minor hazard	60-79
High danger	40-59
Crisis	20-39
Catastrophic condition	1-19

In general, based on the obtained scores, it can be summarized that the innovative component of the financial and budgetary security of the Komi Republic is at an extremely low level, the values of the final score indicates a catastrophic state. Only the values of two out of seven indicators are in the crisis zone, the rest indicators correspond to a catastrophic level of danger. Such low level, the final score, corresponds to the level of high danger, while two of the seven indicators received the lowest possible assessment, their level corresponds to a catastrophic state, and another indicator is in a crisis zone.

The region received the maximum score of 25 points in terms of the “share of high-tech and science-intensive industries in GRP, %”; at the end of 2019 it was 11%, which is more than 2 times lower than the threshold value. The minimum level of the indicator for 5 years was noted in 2018 (10.7%), the maximum - in 2015 (12.7%) in general the dynamics of the indicator over the last 5 years is negative, the average value of the indicator for 5 years is 0.7 % above the level of 2019. The low value of the indicator indicates the presence of a threat of losing the competitiveness of the region due to insufficient development of innovations in the manufacturing sector, the level of danger of this threat is at critical level.

Also, the values of the indicator "labor productivity index" correspond to the critical level of danger. In 2019 the index was 102.7%, which is the highest level in recent years; since 2018, there is a positive trend in this indicator. To strengthen the position of Komi in the regional and international markets, in our opinion, an increase in labor productivity by at least 6.5% is required, therefore, the level of danger of the threat of a decrease in labor productivity in Komi is at a critical level.

The number of people engaged in research and development in the Republic is more than 3 times lower than the threshold values, which corresponds to the

catastrophic level of danger, while the dynamics of the indicator has been negative. Since 2015 the number of people engaged in research work per 10,000 people has decreased from 45 to 36, hence threat of deficit and obsolescence of qualified personnel in R&D corresponds to a catastrophic level of danger, while maintaining a downward trend indicator.

The score for the indicator “and the intensity of costs for technological innovation, %” also corresponds to the catastrophic level of danger. The values of the indicator in 2019 amounted to 0.7% with a threshold level of 3.2%. The maximum value for the indicator for 5 years was recorded in the region in 2018 at around 1.2%. Despite the decrease in the indicator values in 2019, in comparison with the average level of the indicator for 5 years, there is a positive dynamic of its values, the minimum values were recorded in 2015 and 2016 at the level of 0.2%.

According to the indicators “share of innovative products in the total volume of industrial production”, “internal costs of research and development to GRP, %”, “number of applications for inventions and utility models per 10,000 population, units” the minimum score was set, that is the safety of these indicators in the region is not ensured even to a minimum. Accordingly, the most dangerous threats to the innovative security of the Komi are:

1. The threat of loss of competitiveness of the Komi Republic due to the low level of innovation development, lag in the development of high-tech and knowledge-intensive industries;
2. Threat of non-fulfillment of financing of innovative development of the Komi; consisting in reducing R&D costs and reducing the innovative activity of enterprises, reducing the role of science in achieving the goals of economic development;
3. Reducing the threat of reducing inventive activity of the population, which also tends to undermine the region's innovation potential, its competitiveness.

4. CONCLUSIONS

Thus, the diagnostics of Komi's innovative security using a specially developed methodology for measuring the level of the innovative component of financial and budgetary security showed that Komi's innovative security is at a catastrophic level of danger, for 3 out of 7 indicators, safety is not ensured at all, for other indicators, the level of danger corresponds to the critical and catastrophic levels. During the diagnostics, the following threats to the innovative component of the security of the Komi Republic were identified:

- 1) the threat of loss of competitiveness of the Komi Republic due to the low level of innovation

development, lag in the development of high-tech and knowledge-intensive industries;

- 2) threat of insufficient financing of the innovation sphere;
- 3) lack of inventive activity;
- 4) the threat of low labor productivity;
- 5) the threat of a shortage and obsolescence of qualified personnel.

Without solving the identified problems, the growth of the Komi economy is impossible, since innovations in the post-industrial era are the main conditions for the economic prosperity of the state. The identified threats require the development of a complex of strategic and tactical measures to eliminate them by the state bodies of the region. The first step towards the withdrawal of the region from the deep crisis is the development of the Strategy for the innovative development of the Komi Republic, which determines the goals, objectives, specific stages of increasing the innovative potential.

The presented methodology can be used by both federal and regional authorities when they monitor the state of the innovation and financial and budgetary spheres of the region.

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