

Innovation potential of the territory: evaluation of the current state and development possibilities

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Abstract—This article is devoted to characterizing of the innovation potential of the territory and elements of its components. We made an assessment of the state of the components of the innovation potential as elements of the effectiveness of the management of innovation processes in the region. The article presents the results of a study on the assessment of the innovative potential of a region using an integral indicator on the example of the Novgorod region. The authors conducted an investigation of the state and direction of the innovative structures of the region. Based on this analysis and the characteristics of the state of scientific and innovative activity, we highlight such components as human potential, scientific potential and financial and economic potential of the region. The analysis carried out in the article makes it possible to assess the significance of the components of the innovation potential of a territory, which determine the potential of the Novgorod region in the aspect of innovation, and to formulate the main directions for self-development and activation of innovation activity in the region.

Keywords — *innovative potential, innovative activity, innovative structures, region, advanced production technologies, innovative potential index.*

I. INTRODUCTION

The main goal of the development of the regional economy is to achieve stable and long-term economic growth. At present, in this regard great attention, both at the federal and at the regional level, is paid to the issues of building up the innovation potential, as well as studying the regional features of the innovation activity. The regional specificity of the innovation potential is explained by a set of factors that determine the socio-economic characteristics of each territory, namely geographical location, availability of natural resources, development of transport networks, production, etc. [12] The processes of increasing socio-economic interregional inequality are governed by the impact of a set of elements of territorial socio-economic systems. [11]

The importance of the regional aspect study is contingent on the fact that the development of innovations and their practical implementation are carried out at a specific territory, which has its accumulated human, financial, economic and scientific potential. Thus, innovation activity in the region is subject to a combination of specific factors, which creates the need for their research and measurement.

Currently, there are a vast variety of methodological approaches to the assessment of the innovative potential of a territory, based on a scoring, matrix evaluation system, as

well as the calculation of integral indicators. This fact requires a modification of the used methods for assessing the state of the innovation potential, taking into account regional specifics and the available empirical information. At the same time, in the Novgorod region there is a request to modernize the information technology infrastructure, which makes this study important.

In the current conditions, a key component of the development of a territory is the activation of the innovation activity of economic entities, which requires an assessment of the state of the innovation potential. It is important to identify the main obstacles affecting the performance of innovation activities in the region:

- The absence of a unified approach to understanding the category of “innovative potential” and the methodology for its assessment;

- The regional specificity, i.e. the initial level of the system of management and development of innovative potential in the Novgorod region.

Thus, the main objectives of this study were the following:

- Identifying the components of the innovative potential of the territory as an element of its development.

- Analysis of the state of the innovation infrastructure of the region and the assessment of the level of scientific and innovation activity affecting the state of the innovation potential.

- Evaluation of the degree of development of the innovation potential of the region and the characteristics of its development directions.

II. METHODS

The following methods were used:

- Calculation of dynamics indicators allowed to compare the indicators and to obtain a characteristic of changes in the phenomena values over time.

- Calculation of relative and average indicators allowed us to obtain an objective assessment of the processes taking place (relative indicators) and an average characteristic of a number of socio-economic indicators.

- The index method, as a generalizing relative indicator which characterizes the change in the level of a social phenomenon over time.

- The survey allowed us to get the necessary information from the respondents.

III. RESULTS

To create and develop an efficient innovation economy in Russia, a strong innovation potential is needed. By exploring the theoretical views on the definition of the essence and content of the concept of “innovative potential”, we can distinguish several basic approaches:

1) Activity approach. In regard to this approach, the innovative potential means the measure of readiness and ability of the economic system to carry out innovative activity (V.N. Gunin and others [4]; Mindeli L.E. [9]);

2) Resource approach. In this approach, the innovative potential is considered as a set of resources, due to which the implementation of innovative activities is ensured by the economic system (S.V. Kortov and others [7]; Zinovyeva I.S. [17]);

3) Additive approach. In regard to this this approach, the innovative potential of an economic entity is the sum of the potentials (E.P. Maskaikin, T.V. Arzer [8], Golova I.M. [5], Goridko N.P. [6]).

The modern economic system is characterized by openness and lack of geographical restrictions in the process of introducing scientific and technical ideas and developments. Meanwhile, some researchers of regional development problems, namely A.V. Kataev, N.V. Likholetov [13], T.V. Gashchenko I.V. [16], T.V. Babkina [3], Bykova A. [15] and others - in their scientific works operate with concepts of regional innovation policy, regional innovation system, regional institutes of innovation development.

In the Novgorod region, the Ministry of Investment Policy deals with the management of the region's innovative development. To date, the creation of a system for managing the innovative potential of a region is at an initial stage, legal and regulatory documents are being developed, procedural processes are being tested. At the same time, there is a request from representatives of the business sphere to receive comprehensive support for the implementation and enhancement of innovative processes.

In the Novgorod region, research and educational organizations are predominantly engaged in innovation activities. [10] While describing the state of the regional innovation system, it can be noted that, at present, the following innovative structures are functioning in the region, presented in Table 1.

TABLE 1. INNOVATIVE STRUCTURES OF THE NOVGOROD REGION

Name	Area of activity	Infrastructure
1.GARO Technopark	Providing the rental of production facilities	Total area of vacant premises for residents of the GARO Technopark is 5462.3 m ²
2.Business Incubator "X10". Founder is CJSC Green Industry Trust	Providing the rental of production facilities, tax benefits, legal and accounting support	- The area of premises is 299 m ² . - 15 workplaces equipped with necessary office equipment - Access to information and telecommunication network. - The meeting room.
3.Business Incubator "DA Park"	Providing the rental of production facilities. No tax breaks. Reduced rental rate	The total area of the premises is 1,400 m ² . Office space, meeting rooms, conference room. Parking.

Name	Area of activity	Infrastructure
4.Center for youth innovation creativity "Synthesis"	Providing of space and equipment for work in the following areas: 3D printing, scanning, laser cutting and engraving; CNC milling; CNC turning; soldering, circuitry; programming	Modern equipment and specialized software for virtual modeling, rapid prototyping and production of single prototype samples of various products and devices.
5.Novgorod Technopark CJSC	- Development of innovation infrastructure; - Coordination of the activities of innovative enterprises; - Consulting services; - Development of business plans; - Publishing and printing services.	A business incubator is opened at this technopark.
6.Research Center at NovSU	Implementation of fundamental, exploratory and applied research in priority areas of science and technology	Infrastructure of NovSU

The data shown in table shows, that only three economic entities have the status of a technopark and a business incubator in the region. Technopark “GARO” as of December 31, 2018 had two residents: LLC “ZINUS of the factory “GARO ”(research and development in the field of natural and technical sciences), the number of employees is 13 people; LLC MP-SN (scientific research in the field of natural and technical sciences) which produces gyrostabilized devices. The business incubator "X10" is occupied by one resident LLC "Ay Topper", which produces plywood products for floristics. On the territory of the business incubator "DA Park" there are about 16 companies working in the field of IT-technologies, design, scientific developments, robotics, consulting. In the first half of 2018, scientists at the NovSU Research Center carried out 13 works as part of the state assignment for a total of 22.4 million rubles, 10 projects for grants from the Russian Science Foundation and RFBR for a total of 16.8 million rubles and 46 contractual R&D projects of 7.4 million rubles.

It should be noted that representatives of innovative entrepreneurship have the opportunity to receive federal subsidies for the creation of technology parks and business incubators, as well as tax benefits. The Law of the Novgorod Region of October 25, 2017 No. 160-OZ “On Technoparks and Business Incubators in the territory of the Novgorod Region” [1] specifies special taxation conditions, which contributes to the creation and development of the innovative component of the territory.

Characteristics of innovative processes occurring at the Novgorod region are presented in table 2.

TABLE 2. THE MAIN INDICATORS CHARACTERIZING THE SCIENTIFIC AND INNOVATIVE ACTIVITY IN THE NOVGOROD REGION FOR 2015-2017 [14]

Characteristics	2015	2016	2017	Absolute variation of characteristics for 2017 to that for 2015
The number of personnel employed in science and development, pers.	1638	1602	1739	101
Research and development costs, mln. rub.	1587.8	1694.7	2751.8	1164
The costs for technological innovation, mln. rub.	857.4	966.2	1414.9	557.5
The number of used advanced production technologies, units	1866	2092	1983	117
Number of organizations performing research and development, units	17	19	22	5
Number of patents granted per 10,000 employees, units	6.66	6.37	7.26	0.6
The coefficient of inventive activity (the number of applications for patents for inventions per 10,000 population), units	0.74	0.80	0.78	0.04
Federal and regional financing of enterprises implementing innovative projects in the field of new technologies, mln. rub.	589.0	771.0	463.0	-126
The amount of available land for infrastructure, hectares	11000	11000	10000	-1000
The volume of available energy resources, MW	400	400	400	0

A significant share of indicators of scientific and innovative activity in the Novgorod region in 2017 has a positive trend. Thus, the number of personnel engaged in scientific research has increased, which indicates an increase in the share of interest in research work in the region. The number of organizations performing research and development is increasing (by 5 units over the considered dynamics of years). The innovative orientation of the region is positively characterized by the coefficient of inventive activity specific to the analyzed sphere (the number of applications for patents for inventions per 10,000 people). In

2017 the coefficient is the highest in the North-West region, with the exception of St. Petersburg. It should be noted that in 2017, its value is 0.2 points lower than in 2016 and higher than the 2015 value. Similar changes occurred with the indicator “The number of used advanced production technologies”, their number decreased by 5.2% in 2017 compared to 2016.

Figure 1 shows the structure of the used advanced production technologies by economic activity in 2017 in the Novgorod region.

The information presented in Figure 1 suggests that in the region such industries as “computer manufacturing, electronic and optical products”, “wood processing and wood products manufacturing” are the most technologically advanced. In 2017, in the Novgorod region with a low level of activity, advanced technologies were used by publishing enterprises, food producers, chemical producers, and economic entities engaged in telecommunications. Of course, the distribution of advanced production technologies by types of economic activity is influenced by the structure of the economy in the region.

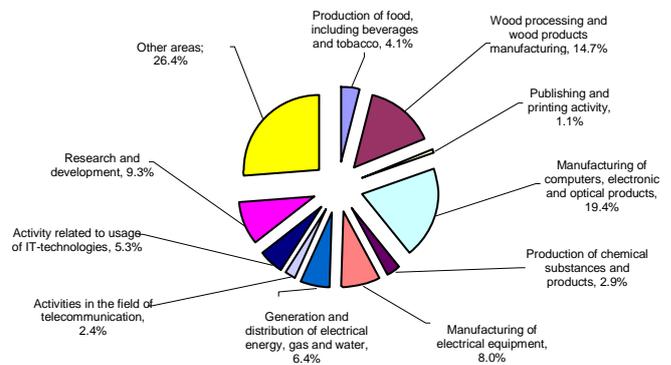


Fig. 1 - Structure of the used advanced production technologies in regards to economic activity in 2017

It should be noted that a number of indicators characterizing the degree of innovative development of the territory, for the analyzed period decreased, this had a negative impact on the innovative potential of the region. First of all, one can see a reduction in federal and regional funding for innovative projects, funding has decreased by 39.9%. There is a significant increase in research and development costs. In 2017, their amount was equal to 2751.8 million rubles, which is 1.15% of the domestic regional product.

To assess the innovative potential of the Novgorod region, we used a modified methodology of S.G. Alekseeva [2], which is based on the calculation of the integral indicator using the aggregated characteristics of the human, scientific and financial-economic potentials of the territory. The integral indicator characterizing the state of the innovation potential was calculated on the basis of the geometric average. In order to calculate the indicators for individual elements of the innovation potential of the region, the following actions were performed: the indicators were

distributed across the components of the potential; figures are given to a common denominator (calculation of each indicator was carried out for 10,000 people). Initial data and calculated innovation potential are shown in Table 3.

TABLE 3. CHARACTERISTICS OF THE STATE OF THE INNOVATION POTENTIAL OF THE NOVGOROD REGION IN 2015-2017

Characteristics	2015	2016	Absolute variation of characteristics for 2016 to that for 2015	2017	Absolute variation of characteristics for 2017 to that for 2015
<i>Human resources</i>					
The number of personnel employed in science and development, per 10,000 people	0.164	0.160	-0.004	0.174	0.014
Total	0.164	0.160	-0.004	0.174	0.014
<i>Scientific resources</i>					
Number of patents granted per 10,000 employees, units	6.66	6.37	-0.29	7.26	0.89
Number of organizations performing research and development, per 10,000 people	0.0017	0.0019	0.0002	0.0022	0.0003
The number of used advanced production technologies, per 10,000 people	0.19	0.21	0.2	0.20	-0.1
Coefficient of inventive activity	0.74	0.80	0.06	0.78	-0.02
Total	7.607	7.382	-0.225	8.2422	0.8603
<i>Financial and economic potential</i>					
The cost of research and development, thousand rubles. per 10,000 people	158.78	169.47	10.69	275.18	10.57
The cost of technological innovation, thousand rubles. per 10,000 people	85.74	96.62	10.88	141.49	44.87
Total	244.52	266.09	21.57	416.67	150.58
Index of innovation potential	1.429	1.432		1.491	

The calculations show that the index of the innovation potential of the Novgorod region is increasing every year, despite the negative values of its individual components, table 3.

During studying the innovation processes in the region, a survey was conducted of economic entities of the innovation

infrastructure of the Novgorod region, which allowed us to identify certain problems and identify ways to solve them. This fact allowed us to formulate directions for the development of the innovative potential of the Novgorod region:

- Insufficient institutional framework for the development of innovative capacity. This problem can be solved through the revision of regional regulations in the aspect of clarifying the list of priority areas for the development of science and technology in the Novgorod region. The other solution is the creation of an expert scientific council and a specialized unit responsible for the implementation of innovation policy.

- Low availability of innovation infrastructure for businessmen of the region. The solution is to expand the innovation structure, for example, by opening an industrial park in the Borovichsky or Starorussky district areas.

- Lack of communication between the innovations being developed and the economic, as well as the investment needs of the region. To finalize the existing regional programs for the development and implementation of innovations in accordance with the economic and investment plans of the region.

IV. CONCLUSION

During the study, we identified approaches to understanding the category of "innovative potential", substantiated the components of the innovative potential of the territory, and selected indicators showing the state of the human, scientific, financial and economic potential of the region. Evaluation of the state of innovation potential of the Novgorod region in the dynamics for 2015-2017 using the integral indicator allowed us to characterize the degree of scientific and innovative activity. The identified trends have a positive trend. The possible directions of development of the innovative potential of the Novgorod region are determined.

Thus, the proposals formulated in the study will improve the efficiency of the innovation policy of the Novgorod region, primarily due to the updating of innovation activities, as well as by expanding access to innovative resources to a greater number of interested entrepreneurs.

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