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STATE SUPPORT OF TERRITORIES WITH HIGH SCIENTIFIC POTENTIAL

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Abstract

Studying public innovation policy improvement aimed at supporting territories with high scientific potential is relevant because a favorable integrated environment for innovative Russian and foreign scientists must be created in order to preserve and develop Russian scientific potential. This article aims at developing an experimental model that establishes the relationship between the readiness for technological development of a territory and (statistically) calculated factors. This research uses general scientific methods of cognition, including analysis, synthesis, and comparison. Results are presented for the development and testing of an experimental model establishing the relationship between the readiness of a certain territory for technological development and various factors. Available statistical data was analysed. A huge gap was found between territories in terms of their readiness for technological development. The factors of creation of scientific clusters are considered. An evaluation system of territorial structures with a scientific potential is proposed. Knowledge-intensive industries and educational systems should be combined into a single multi-industry complex. The author substantiates the need to create an urban planning policy law in Russia. The structure and model of interaction between urban planning and scientific and technical policy for the development of a qualitatively new approach to the management of scientific and technological progress (in some cases, the scientific and technical revolution) is proposed. It is necessary to create a new strategy for innovative development of the Russian economy and education to be used in legislation developed by several committees of the State Duma of the Federal Assembly of the Russian Federation.

Keywords: Innovation policy, breakthrough technologies, territories with high scientific potential, level of readiness for technological development, science city

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1. Introduction

The development of a strategy to create a favorable environment in the Russian Federation for the intellectual activity of domestic and foreign scientists specializing in breakthrough innovative research should be carried out on the basis of deepening the conceptual framework. To do this, we should initially consider the division of all territorial entities according to the level of readiness for technological development (LRTD) in accordance with the total development of breakthrough technologies. Each specialist has his or her own ideas about a favorable complex environment for work. In this regard, there is a need to create a qualitatively new scientific, methodological, legislative, etc. support for the processes of creating a favorable integrated environment for the work of scientists who work in the field of breakthrough technologies.

2. Problem Statement

At the moment, the development of proposals for the creation of a system of interacting territories with high scientific potential in the Russian Federation for the creation of a favorable integrated environment for the work of Russian and foreign scientists specializing in breakthrough innovative research is extremely relevant. To do this, it is necessary to carry out a model analysis of the improvement of the public innovation policy aimed at supporting the development of territories with high scientific potential at the first stage of development, which in turn will allow developing:

- recommendations on amendments to regulatory legal acts in order to improve the integrated environment for the work of Russian and foreign scientists specializing in breakthrough innovative research;
- proposals for the legislative consolidation of norms on territories and research centers with high scientific potential for the activities of Russian and foreign scientists specializing in breakthrough innovative research;
- recommendations for accounting for the impact of changing technological patterns on the Russian economy;
- measures to support university science, small knowledge-intensive businesses and changes in personnel policy.

3. Research Questions

The problems of analyzing foreign experience and developing legislative tools to create a favorable integrated environment in the Russian Federation for the work of Russian and foreign scientists specializing in breakthrough innovative research have now become more acute than ever before. The observed transition to a digital civilization and, accordingly, to a digital economy requires an analysis of foreign experience and the development of legislative tools to create in the Russian Federation a favorable integrated environment for the work of Russian and foreign scientists specializing in breakthrough innovative research, based on a new scientific paradigm.

4. Purpose of the Study

To propose and test specific examples an experimental model that establishes the relationship between the level of readiness for technological development of a certain territorial entity and the proposed calculated (statistically) factors as well as to determine its quality.

5. Research Methods

The study of the issues of improving public innovation policy aimed at supporting the development of territories with high scientific potential was conducted with the help of general scientific methods of cognition, including analysis, synthesis, and aggregation.

The level of readiness for technological development (LRTD) on the basis of the proposed model was evaluated on the basis of an analysis of the eleven most interesting, from the point of view of the problem to be solved, countries and eleven regions of Russia, the level of readiness for technological development was evaluated on the basis of the proposed model.

In the research process, an experimental three-factor model has been developed that establishes a relationship between the level of preparedness for technological development of a particular territorial unit of the number of students in the region in a given year, the number of universities in the region in a given year and gross domestic (for the country) or regional (specific territorial entities in the country) of a product in a given year.

6. Findings

To develop an experimental model that establishes the relationship between the level of readiness for technological development of a certain territorial entity from certain factors, an analysis of available statistical data was carried out. The following indicators were selected (Table 1 and 2):

- Number of students (Wi);
- Number of universities (Si);
- The percentage of students from the population of the region, %;
- The percentage of students from the population of the region, %;
- Human Development Index (HDI);
- Gross regional product (GRP), million rubles; for Russia, gross domestic product (GDP), million USD in 2019.

After anexpert study to create the most adequate evaluation model (as a first approximation), three factors were selected:

- number of students in the region in a given year;
- number of universities in the region in a given year;
- gross domestic product (for the country) or regional product (for a certain territorial entity in the country) in a certain year.

In this case, the following generalized mathematical notation will be used to determine the LRTD:

Utr(1) = f (wi; si; GRP)

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The transition from a general function to a specifically calculated function should be based on the purpose of the study. For the judgemental and at the same time specific numerical characteristics, it is advisable to focus on the following simplified model of Utr(1u) at the first stage of the study. In this case, we will have the following function:

Utr(1u) = (wi-si)/GRP

Table 1. Statistical data for calculating the CCP for some subjects of the Russian Federation

n / a	The subject	Number of students (Wi)[1]	number of universities (Si)[2]	Percentage of students from the region's population, %	HDI[3]	GRP, million rubles[4]	Utr(1u)
1.	Moscow	757350	203	6,2	0,96	178150	863,0
2.	Samara region	110963	43	3,45	0,884	51050	93,5
4.	Stavropol Territory	87676	51	3,1	0,847	71550	62,5
3.	Saint-Petersburg	302907	83	5,8	0,936	419350	60,0
6.	Rostov region	149160	55	3,5	0,869	144620	56,7
5.	Republic of Dagestan	70989	40	2,3	0,844	62510	45,4
8.	Republic of Tatarstan	163201	60	4,2	0,914	246920	39,6
7.	Krasnodar Territory	130461	68	2,3	0,879	234460	37,8
9.	Sverdlovsk Region	135370	55	3,12	0,869	227760	32,7
10.	Smolensk region	26205	26	2,7	0,851	31290	21,7
11.	Kaliningrad Region	27377	15	3,9	0,874	46090	8,9

Table 2. Statistical data for the calculation of the UPcTR for some countries of the world

n / a	The subject	Number of students (Wi)[5]	number of universities (Si)[6]	Percentage of students from the region's population, %	HDI[7]	GRP, million rubles[8]	Utr(1u)
1.	China	52829775	910	0,04	0,758	14342903	3351,83
2.	USA	11748263	2043	0,03	0,920	21427700	1120,12
4.	Poland	1661522	394	0,04	0,872	592164	1105,50
3.	South Korea	1932570	249	0,04	0,906	1642383	292,99
6.	Germany	2645504	354	0,03	0,939	3845630	243,52
5.	Portugal	411238	114	0,04	0,850	237686	197,24
8.	Spain	1256402	109	0,02	0,893	1394116	98,23
7.	Canada	1015000	142	0,03	0,922	1736426	83,00
9.	Latvian	65428	25	0,03	0,854	34117	47,94
10.	Israel	300000	42	0,03	0,906	395099	31,89
11.	Iceland	26153	7	0,08	0,938	24188	7,56

[1] https://rosstat.gov.ru/
[2] Ibid.
[3] HDI for the subjects of the Russian Federation. https://wiki2.org/ru.
[4] https://rosstat.gov.ru/
[5] https://rosstat.gov.ru/
[6] Ibid.
[7] HDI for the subjects of the Russian Federation. https://wiki2.org/ru.
[8] https://rosstat.gov.ru/

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As the analysis of the above data shows, there is a huge gap between the territorial entities in terms of readiness for technological development (LRTD). However, in accordance with the total development of breakthrough technologies and the general technological development (the transition of economically developed countries to the sixth technological order), it is necessary to direct huge efforts to overcome the existing imbalances. A similar situation was observed in the early 1990s. Then it was believed that this task should have been solved by creating a large number of science cities.

A municipality, a science city, develops when there are both knowledge-intensive industries, educational and necessary infrastructure (necessary conditions) and local authorities policies as well as innovative, legislative and resource policy at the federal level (sufficient conditions) (Yankov, 2018; Yusupova & Halimova, 2017). This determines the existence of a special strategy of municipal management in science cities (Vorobyova, 2020). The main one at the moment (based on the technocratic system of thinking) is the combination of science and technology. It is necessary, at a minimum, to unite knowledge-intensive industries and educational systems into a single multi-sectoral complex (Dokuchaev, 2010; Rumyantsev, 2017).

At the moment, well-known organizations with high scientific potential such as "Naukograd" work in the following areas: aviation and rocket engineering, space research, electronics and radio engineering, automation, machine and instrument engineering, chemistry, chemical physics and development of new materials, nuclear complex, energy, biology and biotechnology (Akishin, 2019; Akzhigitov et al., 2020).

At the present time, in economically highly developed countries, there has been a connection between urban planning and scientific and technological policy for some time. Consider France as an example. In France, as in most other Western European countries, universities were and still are the main centers of science development (Tsirenshchikov, 2019). This provision has the force of law in the development of urban planning policy (Volkov & Lunyakov, 2020). Unfortunately, this law is weak in Russia. In this regard, there is a need to create a law on urban planning policy in the Russian Federation.

At the same time, in France, unlike the UK, Germany or Sweden, where small university towns are common, there is no city with a population of more than 100 thousand inhabitants (with the exception of Dunkirk or Nimes), where there would be no university, and there are 377 universities in this country.

The pride of the French Cote d'Azur is the science city of Sophia Antipolis (Karpov, 2012). Excellent climate and proximity to the Mediterranean make this center of scientific research and technological development especially attractive. To some extent, this research center can serve as a reference for solving the tasks set in this study. However, this is hindered by the fact that at the moment science is becoming total and this requires the creation of a qualitatively different urban planning (settlement) and scientific and technical policy. Good examples are very often detrimental to those who try to use them.

Therefore, the structure of interaction between urban planning (settlement) and scientific and technical policy is proposed for the formation of a qualitatively new approach to the management of scientific and technological progress (in some cases, the scientific and technical revolution):

- settlements with a lack of scientific potential;
- settlements with low scientific potential;
- settlements with low scientific potential;
- settlements with average scientific potential;

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- settlements with great scientific potential;
- settlements with huge scientific potential.

This approach, in turn, allows us to propose a qualitatively new model for changing the interaction of urban planning (settlement) and scientific and technical policy based on the concepts of territories with scientific potential:

- village → bigger village → semi-urban type settlement → settlement of a network mobile science city (territory with network high scientific potential);
- satellite city → single-industry city → small science city (specialized area with high scientific potential);
- big city → science city (multi-dimensional territory with high scientific potential);
- megapolis → central science city (concentrated-convergent territory with high scientific potential);

Naturally, these new approaches require the development of proposals for improving the state innovation policy.

A qualitatively new strategy of innovative development of the national economy and the educational sphere is needed, which should minimize the threats caused by crisis phenomena in various spheres of society's life. This strategy in its most general form should provide for (the first one is the stabilization stage, which, most likely, will have to be implemented in 2021–2022):

1) Creation of a qualitatively new legislative support for the development of the educational area (EA). Russia can and should develop and propose legislative initiatives of international and civilizational significance.

2) The transition from the spontaneous formation of innovative development of the EA (and the country as a whole) to the centralized development of project education (followed by the creation of project-praxeological education), which should be based on a fundamentally different ideology of creating a transition to the sixth technological order. This ideology should be based on the pre-eminence of the totality of scientific research, as each (ideally – each educational institution) university to some extent conducts developments related to the sixth technological order.

7. Conclusion

Implementation of the proposed interaction model of urban (township) and research policy for the formation of a qualitatively new approach to the management of scientific and technological progress will contribute to creating a comprehensive enabling environment for the work of scientists specializing in breakthrough innovation studies. In the process of research and practical implementation of the results, the authors of the article developed an experimental model that establishes the relationship between the level of readiness for technological development of a certain territorial entity based on the proposed calculated (statistically) factors. A qualitatively new strategy of innovative development of the domestic economy and the educational sphere is proposed.

The results of the study are relevant in the context of the functions and tasks of a number of State Duma committees: the State Duma Committee on Economic Policy, Industry, Innovative Development and Entrepreneurship; the State Duma Committee on the Commonwealth of Independent States; Eurasian Integration and Relations with Compatriots; the State Duma Committee on Education and Science. This is due to the need to create scientifically based prerequisites for timely and proactive identification of trends in changes in legislative regulation in the field of creating a favorable integrated environment for the work of Russian and foreign scientists specializing in breakthrough innovative research, in order to preserve and increase the scientific potential of Russia.

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