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ON THE QUESTION OF PRACTICAL APPLICATION OF METHODS AND MECHANISMS FOR FORMATION OF REGIONAL INNOVATIVE DEVELOPMENT STRATEGIES

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Abstract: It is possible to notice a recent slowdown in the rates of social and economic development in many regions of the country. This trend depends on many aspects: exhaustion of natural and raw materials, inadequate financing of re-equipment projects, utilization of outdated technologies and equipment in the production regional subsystem. As a consequence, there are: loss of competitiveness of the territory, a decline in investment, and a reduction of the living standards of the population. The key factor in creating an innovative breakthrough in the economy of the region is the concentration of resources and the creation of spatially-expressed territorial zones of outstripping economic growth with a narrow branch of specialization ("Growth Points"). Herewith, recently in Russia a significant gap has been revealed between the formed innovative intellectual products and the process of their commercialization. There is an obvious need for changes in the system of transfer of innovations and new technologies, which must have a stable effect of adaptive synergism. In the global and domestic practices, there are different methods to correctly assess (to a greater or lesser extent) the level of competitiveness of individual regions from the perspective of their innovative development. In the paper the authors analyze the methods and mechanisms of forming the stages of the

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implementation of the regional innovative development strategy presented in specialized literature and based on the results of assessing the level of competitiveness of the region by the criterion of the "level of innovative development".

Keywords: strategy of regional innovative development, assessment methodology, criteria for the level of competitiveness of the region.

1. Introduction

A separately taken region is part of the state as a set of regions representing a well-functioning system; it must meet the requirements necessary for the formation of an effective socio-economic sphere and enhance the innovative level of scientific and technological development of its own - and the entire system as a whole. It is for this purpose that funds from regional budgets are invested in various programs and projects.

The problem is that the effectiveness of these programs from a technological point of view is often not adequately assessed. This, in turn, leads to the fact that the products produced within the framework of such projects are initially uncompetitive, because they refer not to a new wave of innovative technology and therefore, does not meet modern requirements [2].

2. Materials and Methods

The main directions of the innovative development strategy of Russia are confirmed by the determination of the state bodies to not simply declare the choice of an innovative development scenario, but also to create favorable conditions for its real implementation; such directions are connected with the innovative development of industrial enterprises. Support for their innovative evolution is based on the management of promising areas of progressive technologies development (see Figure 1).

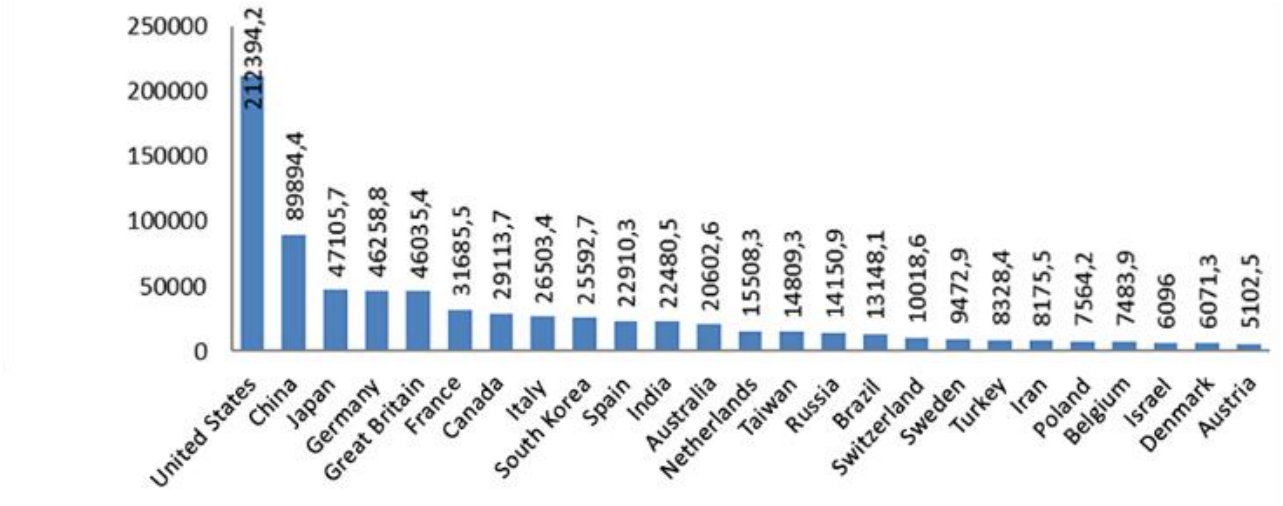

Figure 1. Number of published articles in peer-reviewed scientific publications by country, 2017

Source: compiled by the authors according to the World Intellectual Property Organization. The database contains statistical information on the ranking of countries of the world according to the level of research activity [Electronic source]: Access mode: http://gtmarket.ru/ratings/scientific-and-technical-activity/info

The statistics presented provides the share of enterprises engaged in technological innovation in the total number of enterprises (see Figure 2).

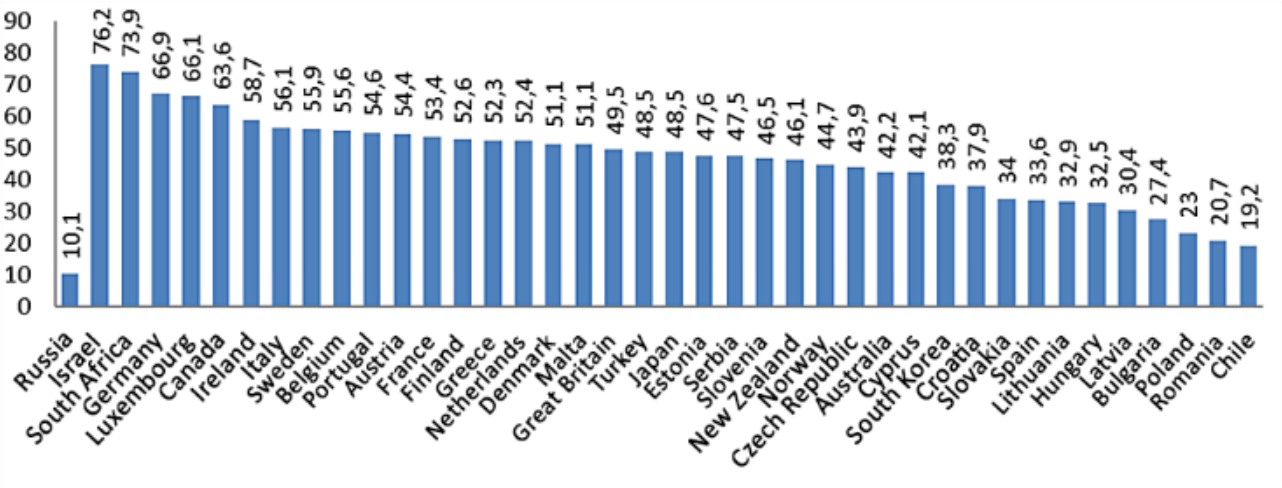

Figure 2. Innovative activity of enterprises for 2017, by percentage

Source: compiled by the author according to the Federal State Statistics Service, Higher School of Economics. The database contains statistical information on the Indicators of Innovation Activities 2015 [Electronic resource]: Access mode: http://www.hse.ru/data/2015/04/07/1096379758/

Investing in newly created small innovation service enterprises is inherently extremely risky, i.e. venture. According to the established practice of venture investments, such enterprises are financed at different stages of development; and also at several stages at once.

Innovative development of the country is one of the governmental priorities. Unfortunately, the budget allocated to the regions from year to year does not solve the problems with the slow development of the innovation sphere. In the paper presented, principles, tasks and models have been developed, and an effective process of innovative development of the subjects of the country has been created.

To characterize the competitive advantage of the region against the background of the country's general economic system, a

correlation-regressive analysis was chosen. As an influencing factor - the proportion of organizations with high innovative activity from the total number of organizations in the region and the amount of GRP (here - gross regional product) per capita - between which there is a close direct link. As a result, the coefficient of determination is 0.498, which means that by 49.8% the variation in GRP is due to the variation in the share of organizations with high innovative activity; and other factors - 50.2%.

"You have so much territory and so few people. We will help you find an application for everything that is not used for your worth" - these issues became essentially remarkable in the past few years for the heads of European states. And not for nothing, since Russia's natural resources are estimated at 4 times higher than in the US and almost 5 times higher than in China, which allowed and still allows to contribute to the country's economic development and its productive potential.

Industrial development in Russia is quite different from Western countries, since it acquires particular significance only in the time of Peter the Great. In XVIII century Russia, large industrial enterprises are encountered more often, but in the West this was a rare exception. While setting high import duties, but at the same time permitting the import of raw materials and tools for factories, Peter the Great created favorable conditions for the development of large-scale industry and development of the regions of the country - by the end of the XVIII century there were more than two thousand industrial enterprises, in which more than 1200 people invested their work.

The peculiarity of the normative and targeted approach to the creation of the project of regional innovative development consists in the formation of a unified system of practical measures within the framework of integrating innovative components into the strategy of social and economic development of the regions, as well as tools for its implementation. This approach includes selection tools and characteristics of targeted programs and subprojects, as well as it determines the structure of the management influence on the achievement of a certain result in shaping the level of innovative development of the region in question.

The factor chosen in the Russian economy does not have a significant influence on the formation of GRP. This is clarified by calculating the coefficient of determination, where the share of innovative goods in the total value of goods of the whole region and the GRP was taken. 0.012 is the coefficient of determination, which means that only 1.2% of the GRP variation is due to the variation of the selected factor, and 98.8% is influenced by other factors.

There is a slight relevance between the share of domestic expenditures directed to research and development and the volume of GRP per capita. The coefficient is 0.158, which means that only by 15.8% the GRP variation is explained by the variation of internal expenditures aimed at conducting research and development, and 84.2% are other factors.

A moderate direct relevance exists between the number of filed patent applications per thousand inhabitants and the per capita GRP. The coefficient of determination is 0.223; therefore, the impact of the number of applications filed for the patent in the amount of GRP is 22.3%, and 77.7% - other factors.

In the long run, two main GRP influencing factors can be identified: the number of organizations with high innovative activity and the number of filed patent applications per thousand inhabitants. The low influence of the remaining two factors (the amount of internal expenditures directed to research and development, and the share of innovative goods in the total volume of goods shipped) once again confirm the destructive nature of the innovative development of individual subjects of the country, that is, with the costs of innovative development and research, their subsequent introduction remains at a low level.

In the process of forming a common level of development of regional industrial complexes (RIC) and regional innovative infrastructure, it is necessary to build targeted programs to increase the level of innovative development of regional manufacturing enterprises.

Strategic management is a system of entrepreneurial management of the RIC's activities aimed at developing strategies that allow future changes to be evaluated and taken into account in current decisions, and ensuring the arrangement of these strategies implementation.

The main guideposts of strategic management are:

— The principle of scientific and technical foresight and strategy development. The development of the strategy involves selecting the most effective ways to achieve the objectives, taking into account the comparison of alternative options for calculating resources and the dynamics of their changes, taking risks into main areas of activity;

— The principle of reconciliation of external and internal factors of enterprise evolvement in the development of strategies and cost accounting;

— The principle of the correspondence of strategy and tactics to enterprise management. It can be fulfilled only if the implementation of the development strategy

becomes a shared cause for the entire workforce of the enterprise;

— The principle of the priority of human capital in the projecting and implementation of the development strategy;

— The principle of correlating performance with the achievement of strategic goals through the implementation of strategic control during the process of their realization.

One of the most significant areas can be considered the Urals mining and metallurgical region - namely the Sverdlovsk Oblast (region), once part of the Siberian province, where from the very beginning there were unique deposits of minerals. At the moment, this region is considered to be a traditional industry, because the city-forming enterprises that are in it today are strategically important for the country. Especially distinguished is the Ural Metallurgical Plant on the Iset River, since the date of the whole region foundation is considered to be the day when it began its actual work. The plant became a town-forming body and as a result, city of Ekaterinburg, named after St. Catherine (patroness of metallurgists) and Empress Catherine I of Russia, began its existence, and now is the administrative center of the region.

Now the Sverdlovsk region ranks second in the country in terms of industrial output: Nizhniy Tagil Iron and Steel Works (4/5 of pig iron production and 2/3 steel production in Sverdlovsk Region), Uralmash (UZTM - Ural Heavy Machinery Plant), Urals Turbine Plant (UTZ - power engineering enterprise for designing and production of turbines) and more than ten other large enterprises for a long time form the line of development of the traditional industrial region. But in spite of large volumes of production, the inertia of the processes in the industry of the region still remains.

Consideration of the factors that affect the inertia of the economic structure of the traditional industrial regions, as follows:

1) Immensity of urban economy;
2) History of the region;
3) Investments in city-forming enterprises and their functioning;
4) The state of the city's economy (stability or transitivity);
5) Ability to innovate;
6) Extent of expansion of urban economy.

To assess and analyze the inertia, there is an algorithm that includes an analysis of basic indicators, an analysis of the urban economic structure dynamics, and analysis of structural changes. More details on the second paragraph of the algorithm.

A part of industrial enterprises in the region simultaneously has the properties of inertia and dynamism, which have a strong influence on the dynamics of their development - since it belongs to the science-driven industries. The inertia does not allow changes in short periods of time. This means

that the formed trends of the past period continue to operate in the future.

To clarify, it is possible to consider the rating of Russia's regions in terms of the efficiency of industrial production. There are data for 2008 and 2009. The rating process takes into account such indicators as labor productivity, yield on capital investments and the share of profitable organizations. According to the assessment results, the regions are divided into classes and they are awarded points from 1 to 100 (1 - low, 100 - highest rating).

Table 1. Rating of regions of Russia in terms of industrial production efficiency in 2008.

Ranking place in Russia	Region	Score	Rating class
1	Tyumen region	66.35	A - High
2	City of Moscow	61.11	A - High
3	Yamalo-Nenets Autonomous District	52.30	A - High
4	Khanty-Mansi Autonomous District	51.90	A - High
5	Republic of Bashkortostan	51.14	A - High
6	Republic of Mordovia	50.27	A - High
7	City of Saint-Petersburg	48.62	A - High
…			
25	Sverdlovsk region	42.70	B – Above the average

Table 2. Rating of regions of Russia in terms of industrial production efficiency in 2009.

Ranking place in Russia	Region	Score	Rating class
1	Tyumen region	62.99	A - High
2	City of Moscow	58.51	A - High
3	Yamalo-Nenets Autonomous District	53.97	A - High
4	City of Saint-Petersburg	52.04	A - High

5	Khanty-Mansi Autonomous District	51.14	A - High
6	Nenets Autonomous District	50.54	A - High
7	Republic of Bashkortostan	45.56	A - High
…			
53	Sverdlovsk region	31.64	C - Below the average

Analyzing the data of Table 1 and Table 2, it is possible to conclude that speaking of industry development, Sverdlovsk region is inferior in pace to higher regions. At the stage of active development is St. Petersburg; first three positions are steadily occupied by the Tyumen Region, Moscow and the Yamalo-Nenets Autonomous District.

The main directions of Russian innovative development strategy evolvement confirmed by the determination of state bodies - is not just to declare the choice of an innovative development scenario - but also to create favorable conditions for its real implementation, are associated with the development of industrial enterprises. Support for their technological development is based on the management of promising areas of industrial technology development, including the development of common research programs, technology diffusion and risk sharing.

Solving economic problems requires a comprehensive economic policy of the state creating conditions for the development of industrial enterprises.

It is necessary to transform the existing branch structure into a modern diversified system - which is oriented towards the final output and pooling of resources, private capital and the state bodies in order to create promising technologies (including the field of governance/management).

Concrete and detailed justifications are needed to identify the so-called possible growth points in production facilities, and hence, in the formation of new industries. In accordance with the objectives of industrial policy, it is necessary to develop methods for its implementation and develop grades of influence on the consumer.

The main management problems of industrial enterprises development nowadays and in the future are: increased attention to long-term forecasting of trends in the development of industries; identification and coordination of national goals; expansion of the range of factors considered in the analysis of programs for redouble influence on the various links of the socio-economic system; combination of methods of qualitative analysis with mathematical modeling in substantiating

solutions to specific problems of commercial industries and their areas of activity; development of approaches to program research, application of methods of software (system) analysis along with traditional methods; identification and coordination of goals and strategies; analysis and planning of development management programs and their comprehensive evaluation.

The mentioned problems of industrial enterprises are generally interrelated, but the problem of improving management efficiency in many cases is decisive. The introduction of adaptive strategic management, adequate to changes in the surrounding business environment, can in many respects solve the listed problems.

The complexity, scale and long-term nature of the processes of radical, innovative transformations in Russian industry requires the development of new strategic models of social and economic evolvement, which, in turn, requires not only the development of new management systems, but also the clarification of the corresponding methodological apparatus.

Of particular importance is the task of changing the established practice of managing Russian regional industrial complexes at the "meso-level" - which is far from fully meeting modern requirements.

Competitive market assessment, enterprise feasibility study, and, most importantly, the search for creative management solutions that correspond to a rapid change in the business environment are essential. At the same time, planning should be of a warning nature, the organization - focused on flexible structuring of interrelations between divisions, motivation - assume teamwork style within the staff, and control - to be based on a constant correlation of levels of actual and normative adaptation.

It should be noted that foreign theory and practice of strategic management is methodologically furnished; it also has been tested on a large number of international corporations. And some adapted methodological importations from foreign publications within this study generally can be admissible for regional industrial complexes, since they do not reflect the conceptual provisions for adapting the system of strategic management in industrial enterprises.

One of the most significant areas of Russia can be considered the Urals mining and metallurgical region - namely the Sverdlovsk Oblast (region), where from the very beginning there were unique deposits of minerals. At the moment, this region is considered to be a traditional industry, because the city-forming enterprises that are in it today are strategically important for the country. Especially distinguished is the Ural Metallurgical Plant on the Iset River, since the date of the whole region foundation is

considered to be the day when it began its actual work. It should be noted that the share of investments in the region is low, but it is innovatively active – however, compared to other regions the rates of development are prone to slow in progress; according to Russian Federal State Statistics Service (Rosstat) the region is considered inertial-developing - the development processes take place gradually. Therefore, it will be rational to consider the competitive potential on the sample of the above region.

Sverdlovsk regional GRP in 2017 was 1586.2 billion rubles. The share of GRP of the Sverdlovsk region in Russia's gross domestic product (GDP) in 2016 was 2.38% (6th position in the Russian Federation). 86% of the volume of shipped goods of regional production and works and services performed are accounted for by manufacturing industries, 11% - production and distribution of electricity, gas and water, 3% - extractive industry.

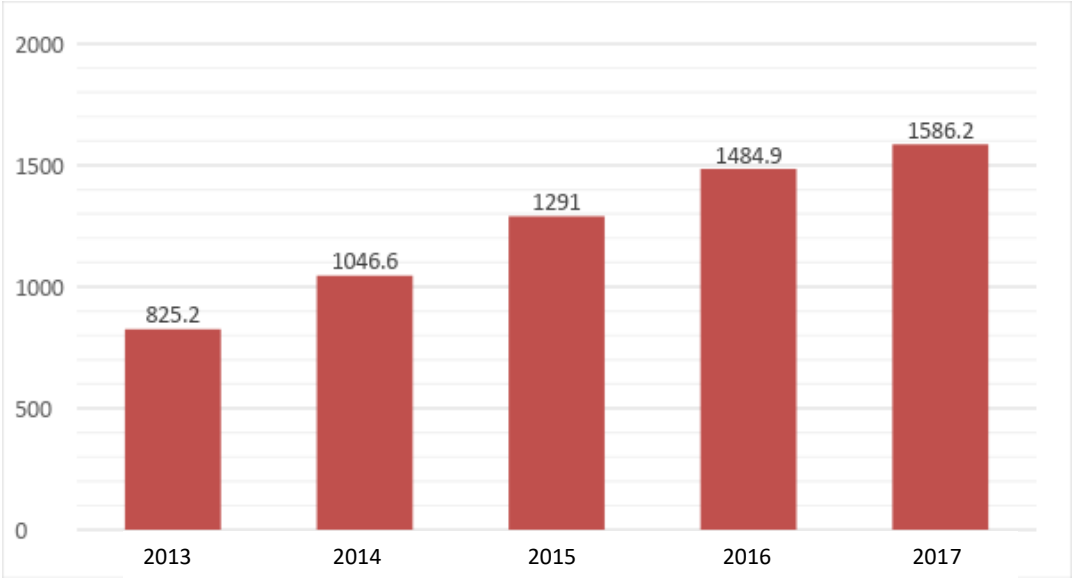

Figure 3. GRP for the Sverdlovsk region, in billions of rubles.

According to the diagram in Fig. 3, it is possible to conclude that the region is actively developing and the position of the regional economy is improving significantly.

To fully assess the competitive potential, it is necessary to compare the area with other regions.

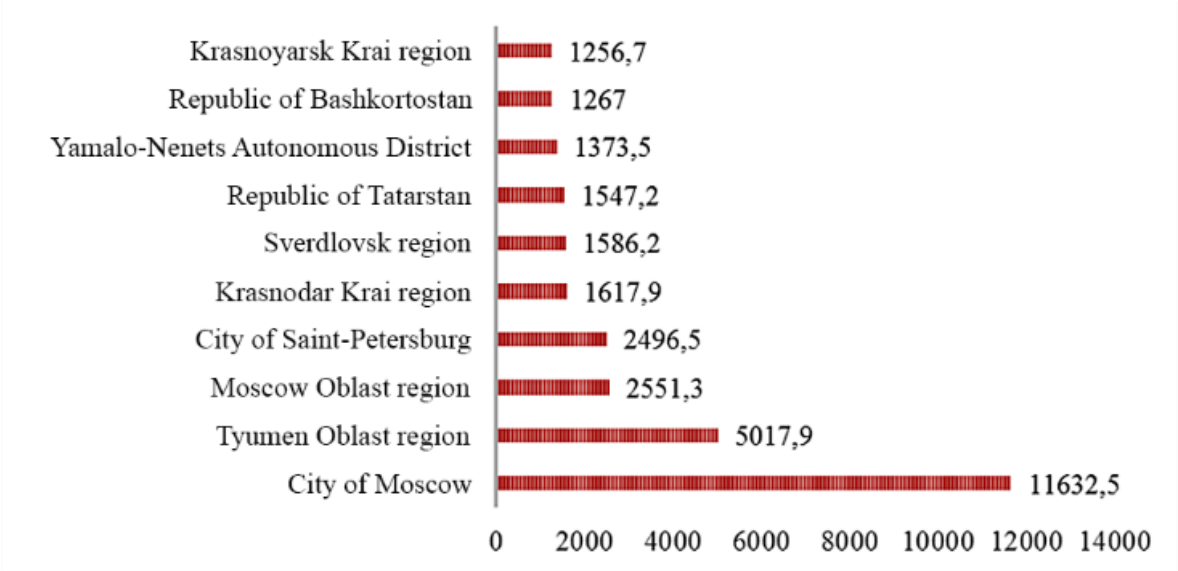

Figure 4. GRP for the constituent entities of the Russian Federation in 2016, in billions of rubles.

It can be seen that the GRP value of the region in question is relatively remote, which confirms the slowness of its pace of development.

The Sverdlovsk region can be rightfully considered the supporting industrial region of Russia. Its industry accounts for almost 100% of titanium production, more than a third for copper, rolling equipment and freight cars, over 20% for steel pipes and iron-based alloys. A distinctive feature of the industries' branch structure is a high proportion of basic industries: 55.5% of ferrous and non-ferrous metallurgy and 15.4% of manufacturing engineering.

Almost all titanium production is located in the region under consideration, as well as production of more than 1/3 of copper, rolling machines and trucks, more than one-fifth of steel and iron alloys. Note an essentially high proportion of ferrous and non-ferrous metallurgy (55.5%) and manufacturing engineering (15.4%).

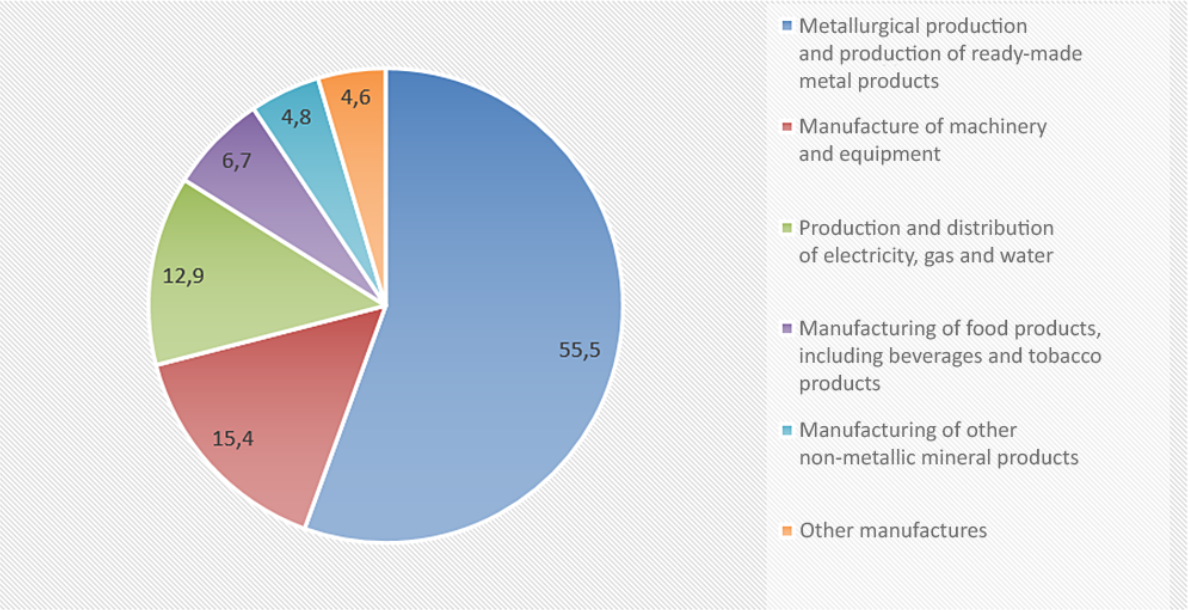

Figure 5. Sverdlovsk region industry structure in 2017

Sverdlovsk region is one of the most science-driven regions in Russia. Scientists work in the field of the most popular scientific trends - information and nanotechnologies, energy, medicine.

Innovative activity in the Sverdlovsk region ranks 6th among the regions of Russia in terms of the number of patents granted (924 units in 2016, of which 34% are patents, 34% are trademark and service mark certificates, 29% are functional patent models and 3% - patents for design); it also ranks 4th between subjects of the Russian Federation in advanced production technologies (process documentation, production drawings, equipment necessary). In 2014, based on the Pervouralsk metallurgical college, the Pervouralsky Novotrubny Plant (steel pipe-producing plant) was launched in cooperation with the Ural Federal University. The Sverdlovsk region is one of the most developed industrial regions.

About 21000 people in the region are employed in the field of research and development, about 2/3 of all scientific-research institutions of the Ural Federal District are centered here, including the Academy of Sciences, 32 universities with more than 176,000 students, 104 regional professional educational institutions, etc. The volume of scientific and technical works performed by the companies of the Sverdlovsk region in 2014 averaged at 45.6 billion rubles, expenditures for research and development - 31.3 billion rubles.

As a result, it can be concluded that the competitive potential of the region under consideration is quite high and has a positive

development dynamics. The inertia of development is still present, which can be seen being compared with other regions, but the pace of economic development and the level of innovation activity increase significantly every year.

3. Results

The outlines of the components of the mechanism for forming a strategy for regional innovative development are shown in Figure 6.

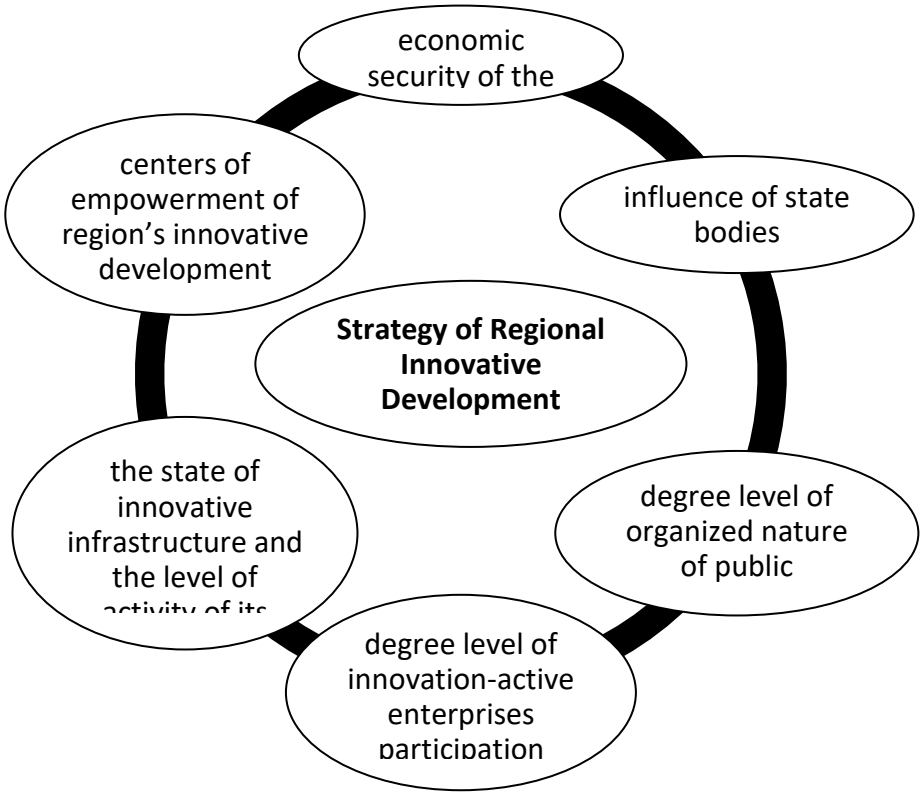

Figure 6. Components of the mechanism for forming a strategy for regional innovative development.

Based on a number of criteria allowing to take into account the parameters of the region's resource system, socio-economic priorities and perspectives of its development, a model of a program for targeted innovative development of the region was projected (Figure 7).

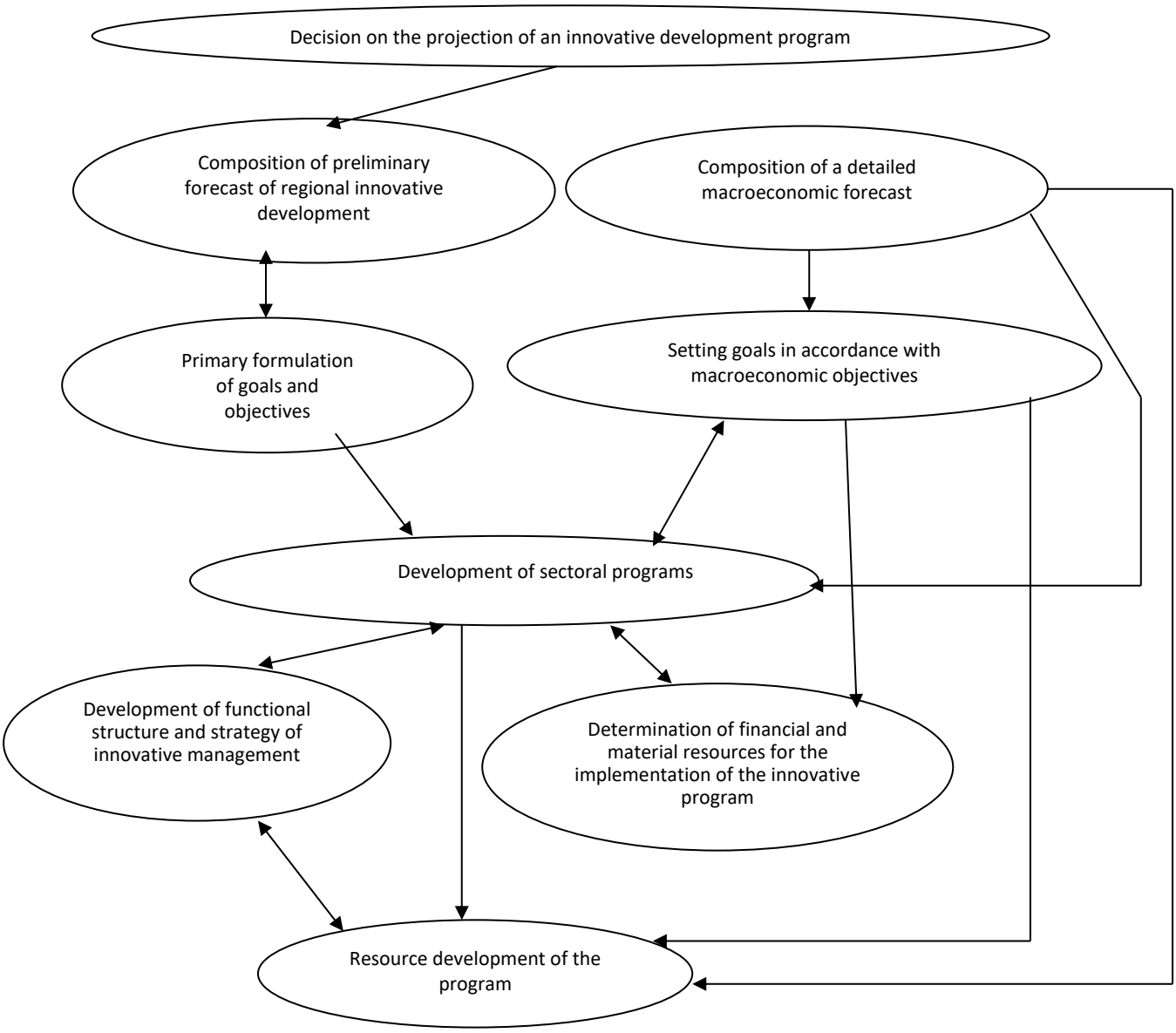

Figure 7. Model of the program of targeted regional innovative development.

On the basis of the formed mechanism of functioning of the adaptive innovative infrastructure of regional industrial complexes, with respect to the level of innovative potential and the tasks of the strategy of regional social and economic development, it is necessary to determine the type of innovative strategy of the perspective development of the subject of the Russian Federation.

The authors propose to evaluate the quality of the targeted program by an expert method; the questions necessary for rating evaluation should be presented in the form of groups; the integral rating also should be

calculated with the following categories of rating issues:

a) program execution results;
b) risk assessment, forecasting and planning;
c) reasonableness of management strategy;
d) reasonableness and expediency of the target program structure.

4. Discussion

Before raising the issue of the formation and implementation of the activities of the regional innovative development program, it is necessary to develop a methodology for assessing the level of its competitiveness by the criterion of "the level of innovative development". The steps that need to be taken to conduct such an assessment are shown in Figure 8.

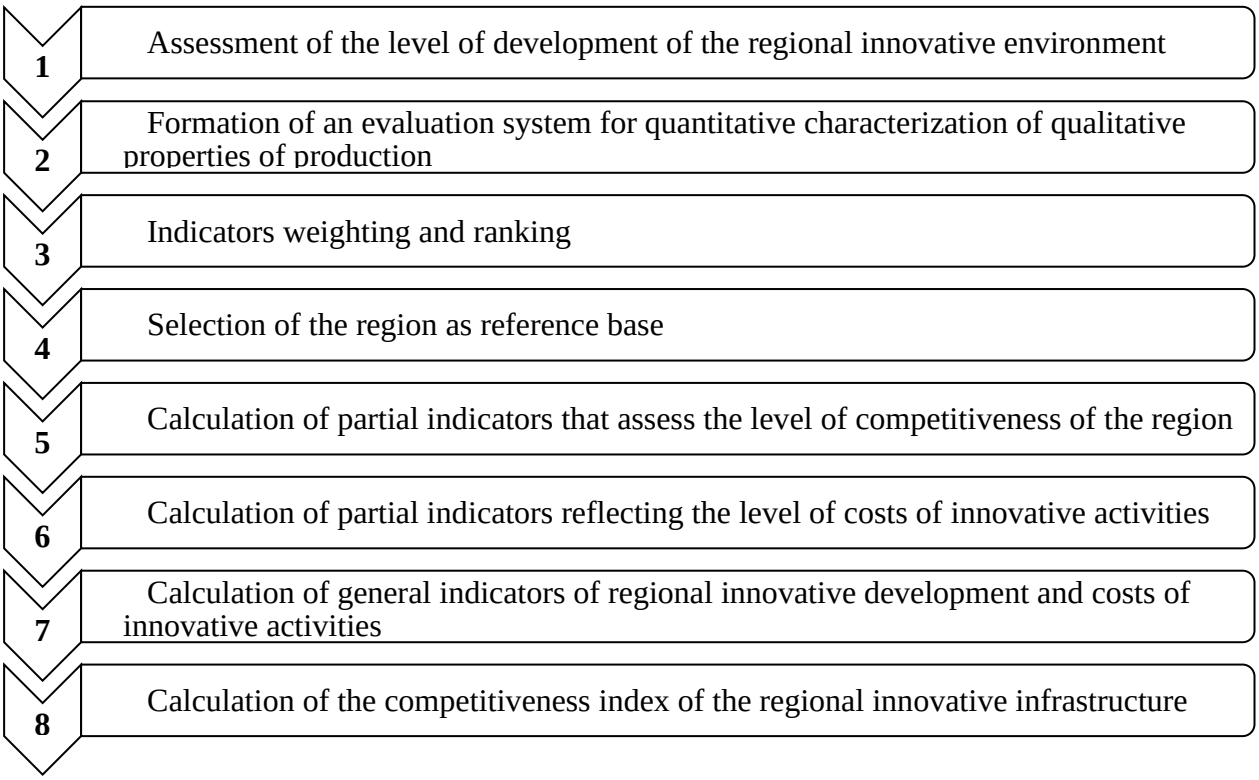

Figure 8. Stages of modeling the process of assessing the level of regional competitiveness by the criterion of "the level of innovative development"

1. Assessment of the level of development of the reginal innovative environment. At this stage it is essential to research the region's activity in the field of innovation in four areas:

1) Assessment of the innovative infrastructure of the region in dependence on its favorableness for the formation of a high-tech environment;

2) Assessment of existing opportunities in the context of the assistance from regional government bodies to the innovative environment development in the region;

3) An estimation of cumulative potential of innovatively-active managing subjects (including regional industrial subsystem);

4) Assessment of conditions for the formation and implementation of innovative projects and programs; and the degree of development of such projects implementation system in the region.

2. Formation of an evaluation system for quantitative characterization of qualitative properties of production.

The position of innovation in the innovative activity of the regional industrial complex is demonstrated on Figure 9.

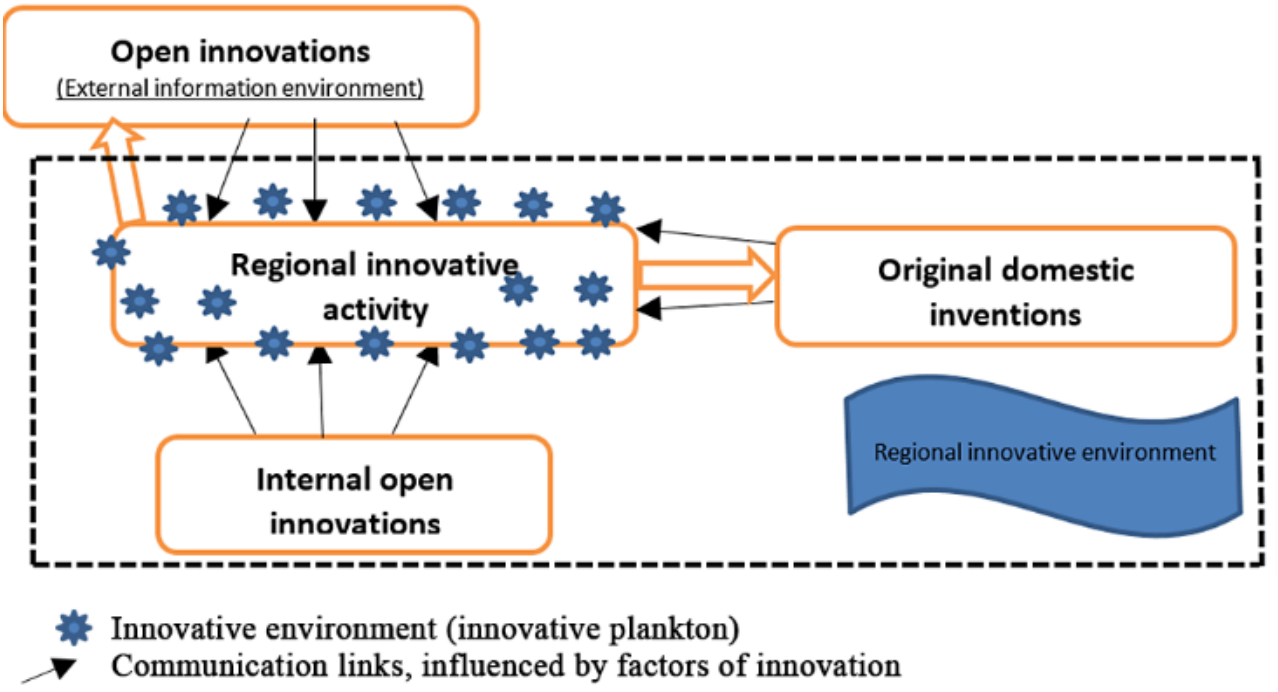

Figure 9. The position of open innovations in the innovative activity of the regional industrial complex

In global and domestic practices, there are various methods, more or less fully allowing assessing the level of innovative development of the region. Among them are methods, sponsored by such developers as [1]:

- European Innovation Council;
- Organization for Economic Co-operation and Development (OECD);

- scientific divisions of the World Economic Forum and World Bank;
- United Nations Industrial Development Organization (UNIDO) and others.

In our opinion, the Organization for Economic Co-operation and Development and the World Bank are most deeply embedded in the problem of assessing the level of competitiveness of the regional innovative infrastructure. However, the methods of both developers include some downsides, distorting the results of analysis when assessing the level of competitiveness of developing markets, taking into account their special limitations in the process of innovative development.

Based on the results of the study of the above methods, suggestions are made for optimizing the methodology for assessing the level of competitiveness of the regional innovative infrastructure, including the introduction of a certain set of indicators/criteria demonstrated in Table 3 [5].

Table 3. Grouping of indicators / criteria for assessing the level of competitiveness of the regional innovative infrastructure

Group	**Indicator**
Financial potential (sources of financing and their structure)	● Budget ● Private sector Venture investments in total volume of investments Foreign direct investment as part of an innovative products
Human resources	Number of employees engaged in the development, study and creation of innovative developments, including: ● With academic degrees ● Without academic degrees ● The level of employment in the branches of advanced technologies
Intellectual potential (composition and scope of utilization)	● Number of developed technologies related to the sixth wave of innovation ● Number of developed technologies related to fifth wave of innovation ● Number of developed technologies related to fourth (and lower) wave of innovation ● The share of innovation-active enterprises in the total number ● Number of patents issued, per region
Monetization of technologies	● The share of innovative products in gross regional product ● The share of innovative products in region export

	• Innovative products turnover • Number of products owned by small innovative enterprises • Compliance of innovative infrastructure to international requirements

3. Indicators weighting and ranking.

At this stage it is necessary to assess the importance of each criterion reflecting the state of the region in the field of innovation. Each indicator can be weighted based on various methods. In this paper, we propose to pay special attention to the method of determining the values of weight coefficients published in the Land Issue Journal, No. 9 of 2004 under the authorship of A.V. Grigorieva, P.A. Kozina and A.V. Ostapchuk [3].

In our opinion, the data obtained with the assistance of the methodology proposed by these authors will be the most objective, since in this methodology, an expert evaluation and additional evaluation stages are used, based on the mathematical apparatus and leveling aspects of human factor conformism. On the one hand, additional steps complicate the evaluation procedure, but on the other - the result achieved has an increased level of reliability and independence in determining the values of the weights obtained from various experts.

At the first stage, the expert, relying on self-competence, fundamental and applied developments and experience and professional intuition, provides weights and scores for each indicator on a scale of 1 to 10.

At the second stage, to determine the importance of the expert, he/she is invited to assess on a scale from 0 to 100% of own confidence that the values the expert indicated at the previous stage of filling out the questionnaire correspond to the reality.

At the final stage of filling in the questionnaire, the expert needs to assess the degree of influence on the prevailing viewpoint from various sources of reasoning: his/her own research, experience, and intuition.

In conclusion, based on the data obtained, it is possible to calculate the weights for each indicator using the following formula [3]:

$$B_{ij} = \frac{\sum_{k=1}^{n} n_{ijk} \times B_k}{\sum_{k=1}^{n} B_k}, \quad (1)$$

where B_{ij} – the calculated values of coefficients by weight coefficients and each of the estimated indicators,

n_{ijk} – the values of weights and scores by weight coefficients and to each of the

estimated indicators according to the variant of the k-expert,

B_k – ponderability of each expert,

k – number of experts participating in research.

4. Selection of the region as reference base.

The region is considered to be the baseline, in comparison with which a conclusion will be drawn about the superiority or underrun in the region under study. There are several types of regions that can be used as reference databases:

- average in the Russian Federation by socio-economic indicators;
- advanced in the Russian Federation by socio-economic indicators;
- average in the Russian Federation by innovative development;
- advanced in the Russian Federation by innovative development;
- advanced according to global standards by the criterion of "the level of development of innovative activity".

5. Calculation of partial indicators that assess the level of competitiveness of the region. At this stage, the calculation and comparison of the indicators corresponding to the baseline and the region under consideration:

- in cases where the growth of any i-criterion leads to an increase in the level of development of the innovative sphere of the region – equation (2),
- in reverse situations, when the decrease of the i-criterion leads to a drop in the level of innovative development of the region, – equation (3).

$$A_i = \frac{W_i}{W_{бi}}, \quad (2)$$

$$A_i = \frac{W}{W_i} \quad (3)$$

where A_i – partial technical level indicator for the i-marker,

$W_{i,бi}$ – value of the i-parameter of the level of innovative development of the analyzed and baseline regions, respectively.

If the result is $A_i > 1$, then this indicates a higher value of the i-parameter of the innovative development of the region under study in comparison with the region taken as reference base.

6. Calculation of partial indicators reflecting the level of costs of innovative activities. At this stage, the task is to determine what costs are associated with the region, implementing innovative policy. Same with the previous stage, the calculation of the partial cost indicator is carried out according to the formula:

$$З_i = \frac{P_i}{P_{бi}},$$

(4)

where $З_i$ – partial indicator of innovation costs,

$P_{i,бi}$ – value of i-expenses/costs for the analyzed and baseline regions.

7. Calculation of general indicators of regional innovative development and costs of innovative activities. At this stage, there is an aggregation of previously obtained partial indicators. General indicators of the innovative development level and costs for innovation are calculated by the following formulas (5), (6):

$$А = \sum_{i=1}^{m} V_i А_i,$$

(5)

$$З = \sum_{i=1}^{m} U_i З_i$$

(6)

where А, З – general indicators of the level of development of the innovative environment and the level of costs for the implementation of innovative activities in the region,

V_i, U_i– the weight coefficient of the i-indicator of the innovative environment level of development and the level of costs for the implementation of innovative activities in the region.

8. Calculation of the competitiveness index of the regional innovative infrastructure. At the final stage of assessing the competitiveness of the innovative sphere in the region, the competitiveness index is calculated, defined by formula (7):

$$k_p = \frac{А}{З},$$

(7)

where k_p – index of the region's competitiveness in terms of the level of innovative development.

Based on the results obtained, a conclusion is made about which region is more competitive in terms of innovative development:

- $k_p > 1$ – the region researched has a level of competitiveness above the reference region,
- $k_p < 1$ – the reference region is more competitive than the region under analysis,
- $k_p = 1$ – both regions are considered equal in terms of competitiveness of the innovative infrastructure.

Using the results of the above assessment of the regional level of competitiveness, strategies for regional innovative development are developed, with reference to the following recommendations:

Recommendation 1: when k_p >"1" - it is recommended to implement a regional strategy, which implies the generation of technical and technological innovations. This strategy generates the process of solving the tasks of building up the scientific, technical and innovative potential of the regional socio-economic system. Regions with a sufficiently high level of competitiveness in the sphere of

innovative development can act as producers, consumers and exporters of components that correspond to the present wave of technological innovation [4];

Recommendation 2: when k_p="1" – it is recommended to implement a regional strategy, which implies "translator-converter" positioning. This strategy is aimed at investing in innovations that are available for mass use;

Recommendation 3: when k_p <"1" – it is recommended to implement the strategy of the "devourer" ("adsorbent") of regional innovations. This strategy is aimed at obtaining global innovations in forms that are available for mass use and distributing them, adapting for general consumption and, eventually, turning them into an integral part of society at the national level.

Having studied the materials of domestic and foreign authors on innovative development of the regions, and utilizing our own research outcome, we determined the optimal mechanism for the formation of a strategy for innovative development of the region on the basis of a competence approach from the point of view of the simplicity of practical implementation [6]. A schematic simulation of the process of formation of this mechanism is shown in Figure 10.

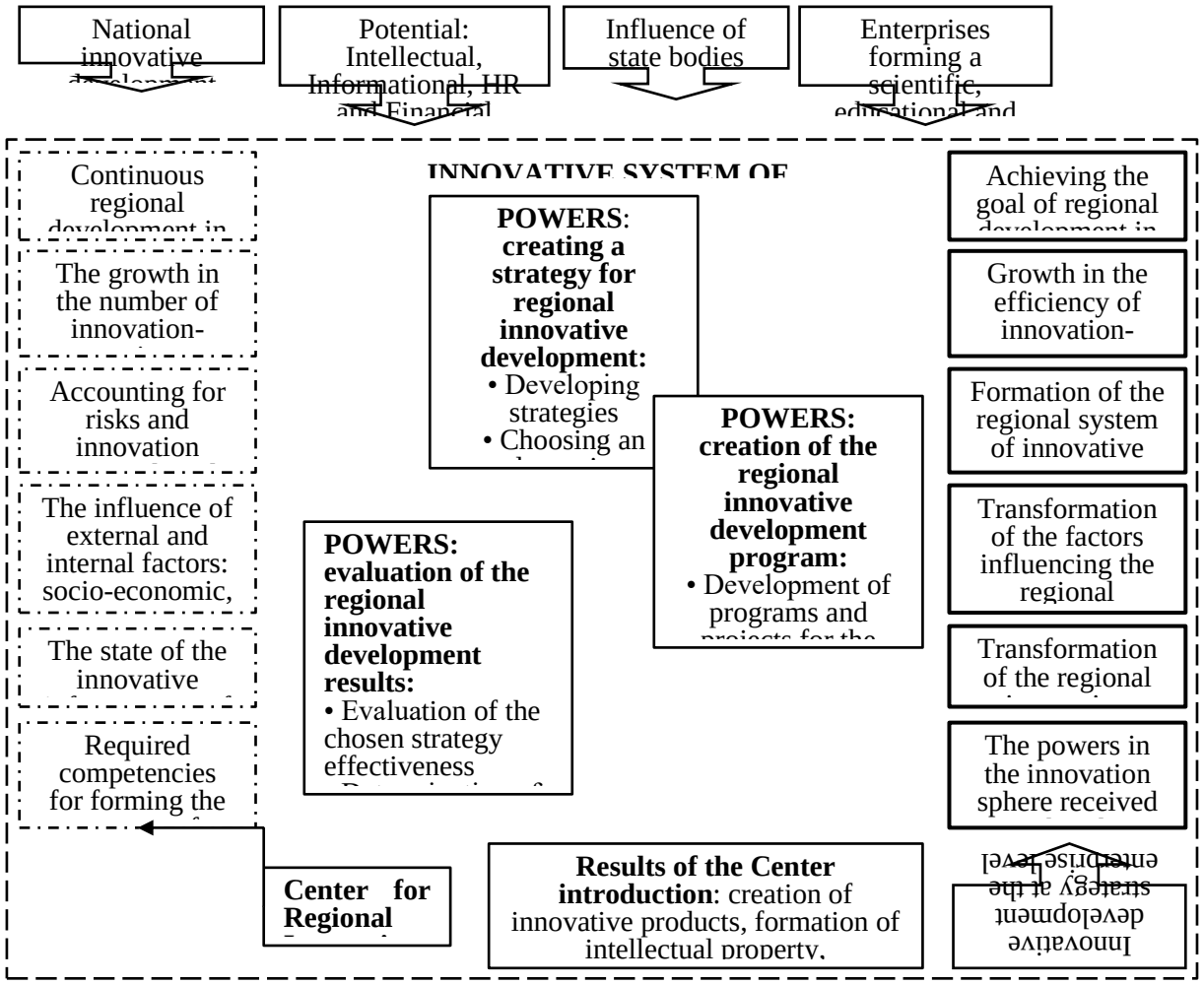

Figure 10 - The process of forming a regional innovative development strategy on the basis of a competence approach

The chart presented above will provide some guidance to the developers in building the stages of innovative development strategy implementation, developed on the basis of preliminary estimates of the regional competitiveness indexes in terms of the level of innovative development (k_p) for each particular region.

5. Conclusion

In conclusion, it should be noted that the above methodology for assessing the level of competitiveness of the innovative environment in the region, as well as the mechanism for the formation of the region's innovative strategy, will allow the regional government bodies to

choose the most expedient directions for regional development.

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