

## Innovative Development of Region in the Conditions of Formation of Knowledge Economy

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### Abstract

*This article reflects the need of formation of regional innovation system in view of becoming a knowledge economy. Paying special attention to the problems of development of innovative economy of Russia, the authors identify the main directions of development of regional innovation systems. It was noted that for future innovative development an important role will be played by person's attitudes, behaviors that either contribute to the spread of innovation in the economy and social life, or prevent him. A key role in the innovative development of the region belongs to infrastructural support innovative entrepreneurship. Strengthening of the regional component in the formation and implementation of innovation policy in the Russian Federation is the need for measuring and comparing levels of innovative development of individual regions. It is necessary to develop an innovative economy, both regionally and at the national level through the development of industrial, financial, human and social capital. The regional dimension is of more importance in the new environment of the information society where the basis of the development of society is inherent in the people, in their human capital. The approach of improvement of the mechanism of functioning of regional innovation systems, according to the authors, will allow creating a competitive and innovative economy in the region.*

**Keywords:** innovation, regional innovation system, innovation economy, knowledge economy, human capital.

### 1. Introduction

In the conditions of information society development and understanding of knowledge as a product of economic exchange and resource creating conditions for the development of human potential of the region is a strategic objective. Innovation is a priority direction of development of the region as it relates to high technology, able to provide significant economic benefits. The primary role is played by research organizations – "generators of new knowledge". The search for new knowledge is a key stage of scientific and technological progress, and the main question is how get this knowledge best and transform them with minimal cost to innovation. The modern economy is not only the economy of knowledge and innovation economy, and the sector of knowledge is a kind of "machine" to solve a variety of problems.

Therefore, the transition to innovative way of development is a key task of modern Russia. Due to the fact that the distinguishing feature of Russia is substantial heterogeneity in regional development, the problems of formation of innovative economy of the country as a whole and individual region in particular are connected with necessity of formation of effective regional innovation systems.

### 2. Methodological Framework

The study used methods of generalization, comparative, abstract-logical, structural-functional, economic-statistical, quantitative analysis, statistical classifications and systematic approach. In the process of preparation of materials there

have been used the official data of the Federal service of state statistics, reference books, scientific papers and development of leading domestic and foreign experts, legislative and normative documents of the state authorities of the Russian Federation, periodicals, and Internet resources, thus ensuring the validity of the research results and the validity of conclusions contained in the work.

### 3. Results

In modern conditions primary belongs to those countries that provide favorable conditions for development of innovative activity, which contributes to the strengthening of competitiveness and economic security of the economic system as a whole. The position of Russia in the most well-known rankings of innovative development of countries is relatively low, and on some international indices deteriorates over time. Thus, in accordance with the International innovation index Global Innovation Index, Russia in 2014 was in 49th place among 143 countries, between Thailand (48) and Greece (50). Strengths of Russia related to the quality of human capital (30 place), business development (43), the development of knowledge and technology (34). Indicators of infrastructure development remain at the average level (51). Hinder the development of innovation imperfect institutions (88th place), the low rate of results of creative activity (72) and the development of the internal market (111). Among the BRICS, Russia ranks second after China (29th place, with a rating of China is now comparable to that of many countries with high income). International competitiveness index (GCI) among 144 countries under consideration Russia in 2014 was in 53rd place.

Many countries have given considerable attention to the development of the market of science-intensive products, where the dominant position today is the USA (over 20 %), Japan (about 12-14 %), and Germany (over 10 %). As for Russia, its share of high technology products in the world market remains quite low and is according to various estimates, from 0.35% to 1 %.

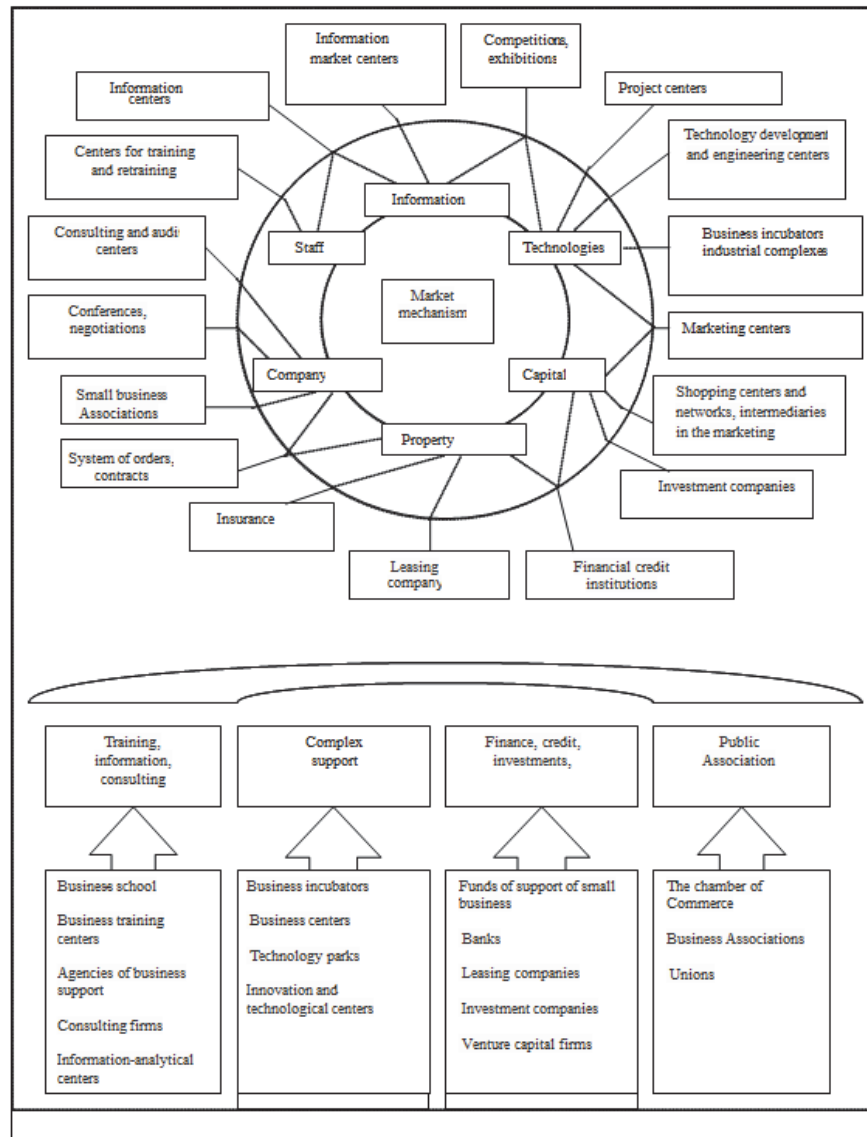
The main problems of development of innovative economy in Russia:

1. Limited domestic demand for innovation. The domestic economy is characterized by low demand for innovations, primarily due to low competition, and more often, monopolization, in many sectors of economic life. Existing state programs are not focused on stimulating demand for innovation. Low domestic demand causes the export orientation of domestic innovation. External demand for Russian innovations is also limited due to raw material specialization of Russia in the modern world economy.
2. The lack of a systematic approach in support of innovation. You must have a developed system of infrastructure of support of innovative entrepreneurship.

The institutional model of infrastructure of support of innovative entrepreneurship in the region can be represented in Fig.1

In most regions of the Russian Federation, including in the Chuvash Republic, the individual elements of infrastructure support of innovation were established and successfully operated, but there is no consistency in the provision of support. Innovators need patterns (of consulting and investment firms, etc.) involved in the engineering of the route to promote development – from idea to innovation. I need everyone to act synchronously. The work on support of innovations is costly. For example, technology parks in Italy are 95% in the Charter of innovative firms, while the authors – only 5%. Who in the Russian economic environment will pay for the promotion of development? In addition, the existing system of information support of innovative economy is not effective enough.

3. The lack of the frame of the innovative economy. Currently in Russia there are certain elements of the innovation economy: special economic zones, technology parks, venture funds, etc., however there are no dominant backbone, "foundations of design". The frame of innovative economy must be a national innovation system.



**Figure 1.** Institutional model of infrastructure provision of innovative entrepreneurship in the region.

4. Problems of human capital. Human capital includes knowledge, skills and abilities embodied in individuals that enable them to create personal, social and economic welfare. Dynamics of human capital in Russia is influenced by two different processes – improving of the educational level of the population and its aging. Those countries, where the second effect outweighs the first, gradually becoming "more poor" from the point of view of availability of human capital. On the one hand, education always gives an increase in this indicator, and in recent years Russia has experienced an educational breakthrough: the number of people with higher education grew by 8%, with secondary special education by 5%. In general, the share of people with tertiary education amounted to 63.5%, by international standards - it's an extremely high result. And this undoubtedly contributed to the growth of human capital.

On the other hand, during the review period, the Russian population got older: percentage of age group 15-24 decreased by 4%, and increased the proportion of group 55-64. Taking into consideration, that the youngest have the largest human capital, who still have many years to be on the labor market, the ageing of the population led to lower aggregate human capital. For most regions of the Russian Federation are characterized by the following features of human capital:

the deterioration of the quantitative characteristics of human capital, which is manifested in the decrease in the

birth rate, the decrease in the proportion of the population under working age;

- worse quality characteristics of human capital, which is reflected in the increasing number of morbidity, increase the number of persons with disabilities, the increase in the number of children, abandoned children and orphans, the increase in the number of children committing crimes and living in socially disadvantaged families, in the long-term unemployment;
  - inefficient use of available regional human capital, which is reflected in the low average level of nominal wages and per capita income, which is the reason for the low standard of living of the population; quite a high level of the educational system with a shortage of jobs requiring high professional qualification of the employee;
  - low creative ability of the majority of the population of working age, resulting in a considerable part of the inhabitants of the region receives income from a single source; insufficient development of small business; low is the self-organization of citizens. Socio-economic problems associated with the development of infrastructure, management personnel of regional authorities in the long term is not addressed
5. Low level of culture of the business community. At the moment the Russian business culture is in an unstable state. New generation of successful managers bring to the business world, more pragmatism and professionalism while maintaining the collective self-organization at a low level. Some movement towards standards of civilized business is determined by the change in the basic life values of leaders as we move into a different age or income group. However, this potential is low today.
6. The problems of social capital. Social capital is a set of structured social relations based on mutually shared and supported by norms, obligations and representations formed in society. Qualitative characteristics of human capital are the accumulated production worker experience, formed and acquired skill qualification.

Problems of innovative development need to be solved, bearing in mind, that that innovation is usually performed in stages. In the process of creating innovative product and its market are the following stages:

- the stage of accumulation of the knowledge, which are necessary to create an innovative product. While this knowledge may be already existing and those that received targeted research;
- the stage of invention and the creation of a new product usually follow for obtaining the necessary knowledge and skills, creative work. Characteristically, the invention, the recipe, etc. can be purchased in market, through licensing of the patented product. It should be expected that in the process of domestic modernization, this method will be widely applied;
- the commercialization phase of a new product is crucial in the innovation process. It is at this stage of the invention (a new product, production method, etc.) becomes a product creates its own market and enters into circulation. The one who provides commercialization, has high chances to become the industry leader, controlling the volume of supply and prices, that is receiving most of the benefits from innovation;
- the stage of distribution of innovations is characterized by the fact that the innovator creates a subsidiary, and if the product is complex, the formation of production and related industries. There is competition for the introduction and establishment of control. Usually at this stage appear simulators, which often displace the innovator of a dominant position on the secondary.

For solving the above mentioned problems there is a need for action of the state and society. A special role in the innovative development of the country belongs to small and medium-sized innovative enterprises that together with a rather strong scientific and educational potential can be a key factor for sustainable economic growth, providing a competitive position in world markets.

Unfortunately, at the present time because of the lack in the country of the relevant legal and institutional environment this resource is not used effectively enough. Apart from the fact that small businesses are experiencing difficulties due to the lack of tax incentives, government contracts and financial support, they also experience specific difficulties characteristic of the innovation sphere. As a rule, they do not have their own costly research and experimental base and due to legal restrictions have difficulties in the use of information, research and production resources public research organizations. Due to low demand for high technologies in Russia they experience difficulties in obtaining orders from the domestic industry, due to low levels of collateral and because of the high risk inherent in innovation, they have almost no access to financial and investment resources, but because of lack of funds, small innovative enterprises experience difficulties in obtaining qualified legal consulting support, particularly in the sphere of legal protection and commercialization of intellectual property.

The institutional structure of the Russian economy, scientific and administrative authorities is inefficient from the point of view of the innovation economy:

- high transaction costs (as measured by cost, time and risk) in innovative business;

- difficult to access basic resources of production (capital, land, energy resources, equipment, premises); reward systems and recognition of success in academia, government and the economy with innovations related;
- there are no conditions for capitalization of intangible assets (according to current rules, in essence, it is impossible to reflect in the balance sheet, it is almost impossible to use as collateral, etc.)

Thus, it is necessary to develop an innovative economy, both regionally and at the national level through the development of industrial, financial, human and social capital.

For the formation of innovative economy in Russia, it is useful to refer to the world experience. There are different models of the innovation economy:

- Japanese model emphasizes the role of vertically and horizontally integrated target groups for synchronized execution of complex activities associated with innovation;
- the Nordic model (Sweden, Finland, which the EU leaders in terms of total innovation index) dominant backbone is linked to the activity status of the Coordinating councils, involvement in implementing innovation management political and administrative structures, which ensures the overcoming of the development of the so-called "valley of death" (the stage between idea and innovation);
- the American model is based on entrepreneurial initiative, the vector of which is directed at a particular segment of the economy through public investment and the functioning of specific institutional structures and clusters (type Silicon valley).

In Russia the most effective is the Nordic model, essential elements of which are high-status coordination councils on innovation, integrating into it the individual elements of the Japanese model, such as a vertically and horizontally integrated task force, and the American model, in particular the point of growth and innovation clusters.

In General, the transformation of the economy through optimization of production, patterns of demand, cooperation, strategy is necessary.

Thus the formation of innovation systems in the regions of Russia with the formation of the knowledge economy has to include two essential components:

- 1) the General development of the industrial, financial, human and social capital;
- 2) the establishment of a network of territorial zones of innovative development (innovation clusters).

The approach of improvement of the mechanism of functioning of regional innovation systems, in our view, will create a competitive and innovative economy in the region.

#### **4. Discussions**

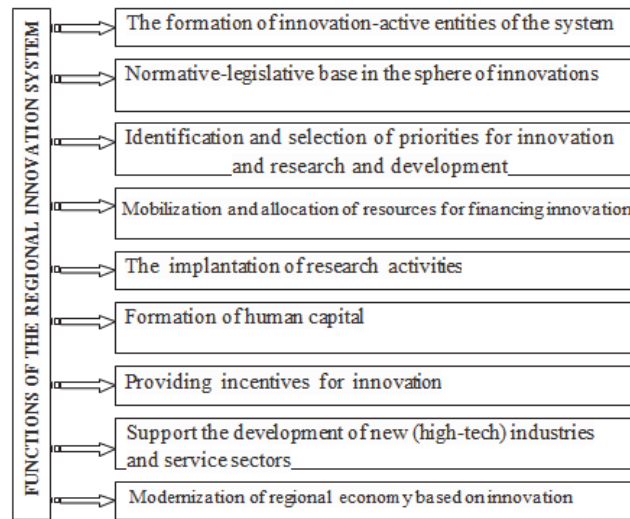
The transition to innovative way of development is a key task of modern Russia. Problems of formation of innovative economy of the country as whole and individual regions in particular are connected with necessity of formation of effective regional innovation systems.

The analysis of different points of view on the concept of regional innovation system (RIS) makes it possible to identify the following common features: 1) the system is a set of institutions initiating, creating and distributing new products and technologies; 2) the main determinant in the subsystems are knowledge; 3) the system performs a number of functions: planning, forecasting, coordination, promotion and monitoring, as well as specific functions: production, generation, distribution and use of knowledge; 4) occur within the system a variety of communication and develop different types of relationships between elements and subsystems.

Summarizing the above, we formulate the essence of the RIS. Under the regional innovation system we mean a system of interaction between institutions-norms and institutions involved in the process of creation, implementation, development and dissemination of innovations aimed at sustainable development of the socio-economic system of the region through the production and dissemination of knowledge, with the regional innovation system is an integral part of the innovation system of a higher order (NIS) and is regarded as an integral system feature state, and prospects of development of innovative activity in the region. The existence of regional innovation systems is a necessary condition for the existence of the national innovation system. At the same time the national innovation system cannot be reduced to a simple sum of sub – systems-regional systems, and has new features (Goretov, Gumarova, Tsaregorodtsev, 2015).

The main aim of RIS is to ensure sustainable socio-economic development of the region and improving the quality of life of the population through active use of innovations.

Thus, the key functions to be performed by the RIS have to include the following (figure 2).



**Figure 2.** Main functions of the regional innovation system

Thus, the essence of the regional innovation system is the interaction of market institutions in the process of promotion of scientific and technical products in all stages of its life cycle. And the development of interconnections between the elements of FIG accelerates innovation in the economy and increases the coverage of innovations in different industries.

For future innovative development there are of great importance a shape of person's attitudes, behaviors that either contribute to the spread of innovation in the economy and social life, or prevent him. Conditions of innovative activity is determined by the set of factors of a non-economic nature, such as "innovation mindset", "fashion innovation", "the cult and culture of innovation", etc.

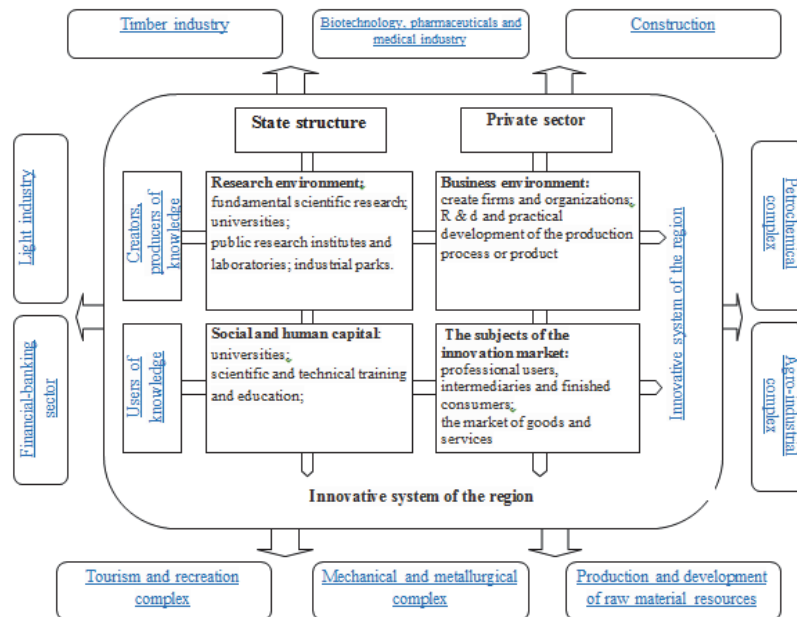
The main competitive factor in the information age and integrated into the world economic system is the ability to learn faster than competitors to apply what they learn. This is primarily an issue of principal with respect to changes in and new, as well as the question of organizing a systematic process of production and realization of innovations (Nikolaeva, 2015).

Study of the innovative factor is considered in connection with the strategy for socio-economic development of Russia and its regions, as the horizon of the impact of the innovation are long-term.

Innovation system should be a Central element in the strategic planning of the region (Fig.3.).

Currently Russian and foreign scientists offer different approaches to assessing the level of innovative development of regions (Sadovin, Kokotkina, Bespalov, Borisov, & Tsaregorodsev, 2015).

So in foreign studies evaluation of innovative development of territories is held on the basis of the integrated indices of competitiveness (macroeconomic competitiveness index (GCI), the business competitiveness index (BCI), the networked readiness index of the communication environment (NRI), the index of technological advances (TAI), and specialized innovation indexes (index capacity for innovation). Overall, these indices – the priority of evaluation using real-life achievements that can be measured using surveys or objective statistical indicators.



**Figure 3.** Innovative system of development of priority branches of economy of region

Domestic research practice innovation sphere has also created a wide range of metrics and indicators that reflect the extent of the innovative potential of the country as a whole and individual areas. More often these two main analytical approaches are used:

- calculation and evaluation of the system of indicators of innovation statistics;
- finding the values of various integral indicators of innovative development.

More often for the characterization of innovative development of the region the innovation index is used, which is calculated as the integral indicator (arithmetic average of the five indices). It is based on various factors, selected on various criteria from the point of view of the authors that characterize innovation, innovative processes.

The basis for the calculation of the integral indicator of innovation development of the region is advisable to include the following indicators (table.1)

Thus, only will be used 18 indicators-indicators.

The sequence of calculations is as follows.

The first step: it is necessary to collect primary information and calculate the values of all the economic indicators by region.

**Table 1.** The system of indicators to measure the development of regional innovation system

Indicators of science and education	Indicators of innovation activity	Performance indicators and the effectiveness of innovation
— the proportion of students enrolled in institutions of secondary and higher vocational education in the total population of the region; — the share of persons with higher education in the total employed population of the region; — the proportion of doctors of Sciences in the total number of researchers in the region; — the share of employment in research and development in the total employed population of the region; — the number of articles published in peer-reviewed journals indexed in RISC, in relation to the number of researchers; — the number of patents per 1 million population of the region.	— share of organizations implementing technological, organizational and marketing innovations in the total number of organizations in the region — the share of innovative goods, works, services in the total volume of shipped goods, performed works, rendered services organizations; — share of expenditure on technological innovation in the total volume of shipped goods, performed works and services; — the share of small enterprises engaged in technological innovation in the total number of small enterprises in the region; — share exports of high-tech goods in total exports of the region; — domestic expenditures on research and development as a percentage of gross regional product.	— to recover the costs of innovation (the ratio of the volume of innovative goods, works, services and expenditures on research, development and acquisition of technological innovations); — innovative efficiency (the ratio of the volume of innovative goods, works and services to the number of innovation-active organizations); — the ratio of the number of advanced manufacturing technologies used to created advanced production technologies; — the number of created advanced production technologies on 1 million rubl. of expenses; — share is significantly modified or newly introduced products in the total volume of innovative products; — volume of innovative products per capita.

Second stage: for each indicator-indicator to determine the leader region having the maximum value. Then calculate the normalized values for all indicators, using the formula (2):

$$a_j = \frac{x_{ij}^{fact}}{x_{mj}^{etalon}} \quad (2)$$

where is the actual value of the j index in the i-th region;

- $x_{ij}^{fact}$  the actual value of the j index in the i-th region;
  - $x_{mj}^{etalon}$  the largest value of j among the considered indicator in m regions;
- $a_j$  - normalized value of the j index

The change in normalized values  $a_j$  in the range [0;1]. Unit corresponds to a high level of innovation activity, zero characterizes the region as inactive.

Third stage: for each group of indicators to sum values and determine the average value for the region for the group. Final integrated indicator of development of regional innovation systems will be the sum of the average values for the four groups of indicators.

$$Int_{pez} = \sum_{j=1}^k \frac{x_{ij}^{fact}}{x_{mj}^{etalon}} / k + \sum_{j=1}^m \frac{x_{ij}^{fact}}{x_{mj}^{etalon}} / m + \sum_{j=1}^z \frac{x_{ij}^{fact}}{x_{mj}^{etalon}} / z \quad (3)$$

where k - is the quantity of indicators-indicators in the 1st group;

m – quantity of indicators-indicators in the 2nd group;

z – quantity of performance indicators in the 3rd group;

Considered groups of indicators have equal weights. Regions are ranked on the basis on the obtained values of integral indicators of the.

Thus, this technique is based on a binary approach, on the one hand, the use of a system of indicators of statistics of innovation and, on the other hand, the integral indicators of innovative development.

Undoubted advantages of this methodology for the assessment of innovative development of Russian regions that distinguish it from most other are the following:

- the use of a relatively large set of indicators (18 indicators), which allows to increase the objectivity of a comprehensive assessment of innovative development of regions;
- the procedure of smoothing the data, which guarantees the sustainability of the results of compilation of innovative rating when you add (exclusion) of certain indicators;
- thorough analysis of economic and innovative content each indicator included in the innovation indicator.

This method of evaluating the effectiveness of the regional innovation system provides visualization of the results, a good management information to make appropriate management decisions.

In conclusion I would like to note, in assessing the development effectiveness of regional innovation systems, it is necessary to pay attention to a number absolute targets, especially those that characterize the activity of the regional authorities in the development of innovation infrastructure:

- presence in the region, Federal universities, national research universities and other higher education institutions conducting research in the innovation sphere;
- presence in the region of small innovative enterprises at universities and institutions of science;
- the presence of the territorial-industrial formations of scientific, technical and industrial type in the region.

Thus it is necessary not only to pay attention to the number of objects of innovation infrastructure, but also to assess the effectiveness of their functioning.

## 5. Conclusion

The dynamic development of any system, including economic, consists of advanced, high elements. In the world share in exports of high-tech products is 10-15 %, and in Russia is about 1 %. Therefore, the necessity of formation of economy of knowledge underlying the innovation development of the region is not in question.

## 6. Acknowledgement

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