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## Regional Clusters in the Strategy of Achieving Technological Leadership

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### ABSTRACT

The article is devoted to problems of formation of cluster systems in NW Russia. Theoretical, methodological and methodical aspects of scientific methods, principles and approaches to formation of cluster systems. Analyzed legislative, regulatory and legal base of formation of clusters, the positive experience of the functioning of cluster systems. The features of clustering, their classification, taking into account geographical, sectoral and industrial specialization of the regions. Identified priorities and identified specific strategic directions of the state cluster policy for the regional and municipal authorities and business entities. Formed system of organizational-methodological and legal documents for governments on the creation of cluster systems in the regions. At the present stage of development of the world economy, the application of new knowledge in production has the character of a continuously accelerating process. Biotechnology, genetic engineering, alternative energy, nanotechnology is currently being actively developed, but is possible on the basis of their development perspective the transition from machine-mechanical technology to “hybrid”, where machine technology is used, coupled with information technology opens the door to a new technological revolution. The main factors that determine the quality of innovation policy in the constituent entities of the Russian Federation, and the prospects of creating an open database of regional priorities and the willingness of the regions to systematically embedded within Federal technology initiatives and predictions.

**JEL Classification:** O30, A10, O18, P48

**Keywords:** Regional cluster, technological leadership, strategy, innovative cluster, sustainable development.

## **1. INTRODUCTION**

Russia sets ambitious but achievable long-term development to ensure a high level of welfare, strengthening the geopolitical role of the country as one of the global leaders that define the world's political agenda. The only possible way of achieving these goals is the transition of the economy to innovative socially oriented development model.

This formulation means, in turn, necessity of formation of economy of leadership and innovations. The quantitative parameters of this economy – employment by 2020, a significant proportion (5-10 %) to global markets of high-tech and intellectual services in the 5-7 positions, an increase of one and a half times the share of high-tech sector in GDP (from 13 to 17-18%), an increase of five to six times the share of innovative products in industrial output four to five times the share of innovation-active enterprises (from 9.4 to 40-50 %). The global economic crisis of 2008-2009 complicated the implementation of the goals set have led to the reduction of expenses of private business on innovation and exacerbated the structural weaknesses of Russian innovative system.

However, the difficult economic situation in the short term does not mean the need to revise long-term development goals. On the contrary, “bar”, in terms of the pace and quality of economic development in 2013-2020 seriously increased. The tasks of post-crisis recovery, acceleration of transition to innovative way of development will have to solve in the conditions of increasing external and internal challenges facing Russia. On the one hand, these challenges complicate the achievement of goals, on the other – require an even greater intensification of the efforts to solve the accumulated in the Russian economy and innovation system problems (Busygin, 2005).

One of the key challenges for our country is strengthening globally competitive struggle for the factors determining the competitiveness of innovation systems, primarily for highly skilled working force and “clever” money (investments, attracting in the projects of new knowledge, technologies, competences), the sharp increase in mobility of these factors. In low efficiency of national innovation system in Russia it means accelerated “leaching” from the country remaining competitive potential – personnel, technologies, ideas, capital. The challenges facing not only our country but humanity as a whole – climate change, population ageing and the challenges of health, food security on a global scale. These challenges dictate the need to advance the development of certain specific areas of scientific research and technological developments (clean energy, genomic medicine, new technologies in agriculture, etc.), many of which in Russia there are no significant backlogs. In order to meet these challenges, Russia needs radically to deeply integrate into the global innovation system to overcome the persistent isolation.

## **2. DISCUSSION**

The theory of technological structures allows us to estimate the parameters of the corresponding changes in the process chains.

Today the world is on the eve of the sixth technological treasure, which is characterized technologies in the field of biotechnology, nanotechnology, robotics, new medicine, technologies, virtual reality, etc. Today we can see only the contours of those innovative technologies, which will be the basis for the economy of the future (Isaksen, 2016).

According to experts, at the current pace of economic and technological development of the sixth technological order will be issued in the period 2010-2020, and in a phase of maturity will come into 20140 years.

Thus, according to forecasts, in 2010-ies will see a new technological revolution based on developments in the field of technologies of the sixth way, which will contribute to the transformation of the greater part of the material production, based on the sixth technological order.

Obviously, the General trend of development of modern industrial economy is the reduction of the need to involve “natural” energy and natural forces for the production of products. This reduces the specific consumption of raw materials, but also in the structure of the product increases dramatically, the share of knowledge used in its production.

Research conducted by the research teams Academy of Sciences showed that the economy of leading countries is now based on the fifth technological structure and begin the transition to sixth, and Russia’s economy is mainly located in the fourth technological way with elements of the fifth. 50% of Russian technologies date back to the fourth technological structure, and almost a third does to the third. The share of technologies of the fifth way makes only 10%. Technology sixth order are only in their infancy.

In this regard, it becomes clear that in front of Russia at the present stage of development is a Herculean task to join in the next 10 years in the number of States technology leaders, creating a developed production of the sixth technological order. Russia needs to do is not only very serious “technological leap”, to realize which is possible only under condition of active use of the mechanism of technology transfer. The main production units should be, in our opinion, the complex integrates the production, science and education in a single reproduction process at the micro level (Matveev, Y. V., Trubetskaya, Lunin, Rousek & Kopnov, 2016). Such complexes should be the basis for the formation of clusters, linking manufacturing enterprises, R&D centers and educational organizations under a single infrastructure.

In recent decades, many governments are developing so-called “cluster strategy”, the purpose is to realize the benefits of the national economy, and not the acquisition of other people’s achievements. Among European countries, a policy actively promoting Switzerland, Denmark, Sweden, Finland, Germany, Netherlands, UK. Government support of cluster initiatives and the clusters is also carried out in the United States, Singapore, India, China, Austria, Indonesia, Malaysia, Mexico etc. According to experts, these clusters employ about 40% of all employment in the economy and produces over 50% of GNP In Russia, since 2000, developed innovative projects for creation of clusters on the example of the Nizhnekamsk petrochemical cluster, the cluster of the Lower Angara region, the automotive cluster in the Volga region, St.-Petersburg Maritime cluster of the Ivanovo textile cluster, the cluster processing of titanium “titanium valley” in Sverdlovsk region, the innovative cluster on the basis of University complex of Tomsk and others.

The idea of forming regional clusters is embodied in the Concept of long-term socio-economic development of the Russian Federation, the approved order of the Government of the Russian Federation of 17 November 2008 No. 1662-R, which provides for the establishment of a network of territorial-production clusters, realizing the competitive potential of the territories, the formation of a number of innovative high-tech clusters in the European and Asian parts of Russia. To date, the use of the cluster approach already is one of the key places in the socio - economic development of a number of constituent entities of the

Russian Federation and municipal entities. At the Federal level a number of mechanisms to provide flexible funding for the development of clusters. One of the latest government measures in the field of support and development of regional clusters was the request of the Working group on development of public-private partnership in innovative sphere under the Government Commission on high technologies and innovations on the competitive selection of pilot projects to develop regional clusters and the elaboration of mechanisms of state support in accordance with the instructions of the President of the Russian Federation. As a result of consideration of Projects were selected for the development program the development of 25 regional clusters that have worked successfully (Pimnev, Zemenkova, Zemenkov & Iljashchenko, 2016).

It is obvious that the sustainable development of innovation clusters is largely dependent on access to advanced sources of scientific knowledge and modern technologies, as well as the capabilities of the concentration of considerable amounts of financial resources. Decisive role in the process of innovation orientation of the cluster is played by the availability of infrastructure intellectual and financial capital.

In the formation of regional innovation clusters, it is also possible the presence of a number of institutional constraints:

- the lack of territorial projection of programs of innovative development and modernization of key state-owned companies;
- no system interaction potential global players (Audretsch, Lehmann & Menter, 2016);
- lack of mechanisms to encourage investors in the formation of clusters (primarily, economic preferences);
- lack of project management mechanisms of territorial development.

A separate important issue, the pendency of which can be a brake on the development of regional innovation clusters, is financing. Often at the preliminary stage of formation of regional innovation clusters the main sources of financing innovative start-UPS are personal savings and “business angels”, over time the main role is played by venture capital funds. But between these stages lies a significant period of time, sometimes amounting to a chasm, which requires the effective interaction of business, academia, and state.

In the world, according to experts from Saint Petersburg University (Kazantsev & Nikitina, 2011), the most famous instruments to support the development of clusters are the following:

- direct funding (grants, loans), which reaches 50% of the costs for the creation of new products and technologies (France, USA, Russia and other countries);
- tax relief for businesses, including the exclusion of tax-deductible R&D costs and write-off of investment in R&D tax incentives universities and research institutes (Japan);
- legislative protection of intellectual property;
- free record keeping for applications of individual inventors, free patent attorney services, exemption from payment of fees (the Netherlands, Germany);
- provision of loans, without interest payment (Sweden);
- targeted subsidies for research and development (almost in all developed countries);

- establish the foundations of innovation, taking into account possible commercial risk (England, Germany, France, Switzerland, Netherlands, Russia);
- grants up to 50% of the cost of innovation (Germany);
- reduced state fees for individual inventors and tax relief (Austria, Germany, USA, Japan, etc.), as well as the creation of special infrastructure for their support and economic security (Japan);
- deferred payment of duties or exemption from them if the invention relates to energy savings (Austria);
- state program to reduce the risk and compensation risk losses (Japan);
- search and attraction of foreign talented professionals, including expedited processing of visas to them, granting scholarships for study and improvement of living conditions (Japan, USA, Australia).

Over the last decade the approach in the framework of national innovation systems has become much more likely to be used by both scholars and politicians. At the same time, a number of authors propose to extend the concept of a system to several levels: global level, regional and sectoral. Global and sectoral levels are important for the observance of completeness, however, the regional dimension is Central. The growth of international competition and integration strengthens the role of the regional dimension because it is at this level begins to realize certain foreign economic activity. Firms to compete in an expanding global environment, they need to exploit the entire economy down to the local and regional levels. Thus, globalization and regionalization go hand in hand (Sharkova, 2010).

From a theoretical point of view, the rationality of the consideration of regional innovation systems lies in the fact that the factors which are crucial in the theory of national innovation systems, such as: the institutional framework, the nature of the relationship between firms, learning ability, intensity of research and development (R&D), innovative activity – are significantly different in different regions. From an empirical point of view it is important to consider regional innovation system as the difference of the intensity of research and development and innovation activities between the regions is higher than between Nation States (Bodrunov, 2013).

Currently, experts allocate two directions of state initiatives to create conditions for the development and commercialization of new technologies.

The first direction was a number of attempts to increase the commercial importance of already-funded research conducted in universities and public research centers. The law Bayh-Dole passed in 1980, was designed to encourage scientists to release their discoveries to market, creating their own companies or licensing technology to other firms. In other words, the law was needed to encourage the universities to turn their research into real sources of income.

The second direction can be considered adoption in the 1980-ies of a number of Federal programs whose main purpose was to facilitate the financing of R & d, producing separate companies. Today in the U.S. there are three state programs aimed at funding innovative small firms.

- “Program of support of innovative research small business” (the Small Business Innovation Research Program – SBIR);

- “Program for technology diffusion to small business” (the Small Business Technology Transfer Program – STTR);
- “Program to create investment companies for small business” (the Small Business Investment Company – SBIC).

These programs coordinate by Administration U.S. small business (Small Business Administration). Their funding comes partly at the expense of the Federal budget for research activities.

The SBIR and STTR programs provide the development of the strategically important directions of innovative activity at the state level. So, the SBIR program with a total annual budget of more than 1 billion dollars every year sold about 1 organizations of innovative technological projects (Il'yashchenko, Chinakhov & Gotovshchik, 2014). Under the SBIC program, the US government provides state funding for young companies, if the entrepreneur was able to raise funds from private investors in the ratio of 2:1 or 3:1 (i.e. two or three parts of capital should be from private sources).

A modern approach to the development of regional innovation strategies for Smart specialization. Smart specialization is a set of rules on the choice of priorities of innovative development. At the national level are set requirements priorities, and the formulation of the strategy is delegated to the regions. This ensures coordination “from above” and the required amount of power. The priorities of smart specialization must not overlap, when the majority of regions focus on trendy topics, such as ICT. Important inter-regional focus, development of complementary competences and cooperation territories. The priorities of smart specialization is not specified above, their choice implies the involvement of a wide range of participants, including residents, interactions with whom carried out in the format of “living laboratories”. Smart specialization of the region is at the crossroads of sectors, combining traditional production with new fast-growing research areas. Finally, the priorities of smart specialization must lead to structural changes in the economy of the region and to be oriented to the solution of social problems.

### **3. CONCLUSION**

However, mechanical transfer methods innovation policy or innovative development from one region to another even within the same country may not give the desired effect. In this regard, there is the problem of typification of regions on the specifics of the level of innovation development and the subsequent analysis of possibility of using well-established approaches within specific groups. In this regard, for purposes of analysis of innovative development of regions and factors that affect it, it is proposed to first carry out the typification of regions on the basis of the innovation index, to highlight clusters of regions with similar level of development of scientific-technological complex, and then analyze the factors that determined the situation, for their participation in the implementation of priority innovative projects in the framework of technological platforms. The emergence and development of regional clusters and innovative activity are natural processes in Russia. The tendency to the formation of clusters often have joint research or production base, moreover, the successful development of the cluster can be guaranteed only under condition that the scientific base allows us to structure the cluster on a number of domestic majors. The formation of regional innovation clusters creates synergy, resulting from the consolidation of resources involved. All participants of the cluster have a competitive advantage under the influence of total effects of scale, scope and synergy.

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