

The Role of the International University Network Organizations in the Innovative Development of Russia

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Abstract: The problems of formation and development of a new model of innovation-based economy, education and business - regional science and innovation clusters are discussed in this article. The institutional and innovative changes in the system of higher education reflect the integration of the Russian economy and higher education in the global and regional economic space. The place, role and function of cluster components: the regional authorities, universities, enterprises, businesses, etc. are identified. It has been demonstrated that the activity of the clusters will allow to create conditions for the development of various sectors of economy and social sphere with respect to the competitive advantages of each region both at the federal and regional level. Improvement the stability and performance, competitiveness of universities, increases the scale and impact of universities, turning them in world and national centers of science and innovation.

Key words: Regional clusters % Innovation % University % Government % Companies % Business structures % Networks % Policies % National University

INTRODUCTION

Innovative scientific activities are the external manifestation of structural reforms in universities. Presently, the role of universities in shaping of the innovative path of the development of Russian economy is increasing, particularly through the specific form of integration of innovations and production in university clusters. The value of innovative potential in the educational process of the universities is constantly increasing in today's market conditions. The major components of the innovative economy like new scientific knowledge, high technologies and highly-qualified specialists became the subject of special attention from all the authorities responsible for the economic development of the country. Competitive advantages, innovation studies and effectiveness are the key components of today's economy and state policy. [1] The goal of the state policy in the field of science is defined by the tasks of the development of innovative part of the university research activities, which involves the targeted work on the effectiveness of scientific research and methods of evaluation of innovative potential of the research activities. The country should develop its own experience

in formation of network structures, providing the highest degree of cooperation of all the members of the cluster: universities, industrial companies, business structures involved in the development of innovative potential. The most important condition for the implementation of the full innovative cycle in the sphere of science and technology is becoming a priority area of university activities. Today, the network integration for the development of prototypes of new products is regarded as a network industry-specific innovative structure and modern universities act as the educational corporations which are able to shape the national innovative potential of the entire educational community, innovative mindset, innovative culture in science and professional education. [2]

The goals of the government policy in our region in the field of the development of science and education should be the following:

- С Creation of a reserve of basic scientific ideas and facilitation in training of specialists for the development of new technologies,
- С Reducing the financial risks of scientific and technological projects,

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- C Mediating the interaction between the academic and applied science,
- C Reducing the imbalances in the scientific sphere and the backlog of material and technical base of science,
- C Development of the knowledge base for scientific research,
- C Development of grant support for scientists, among other things, based on equity participation of the regions
- C Support of the youth policy in science,
- C Development of research for the modernization of education,
- C Formation of the federal network of highly qualified scientific and educational centers,
- C Development of cooperation with regional administrations in the field of education and science at the regional level,
- C Improvement of the system of postgraduate studies, doctoral studies and training of highly qualified specialists.

In the next few years the universities themselves, apparently, cannot yet act as sources of innovative breakthroughs because of the lack of financial resources, management structure, innovation support, focus on the extensive development strategy and price competition. Thus, in the nearest future the integrated clusters consisting of universities, industries, businesses and government agencies can act as centers of innovation activity in Russia [3].

And of course, the government initiative to stimulate the processes of modernization and innovation engages an overwhelming number of strong universities. Universities are regarded as key actors of modernization processes that should result in an emergence of a new, non-oil economy of the country, reestablishment of its competitive positions, especially in the education and innovation system and perhaps even improvement of the quality of life.

Only those universities that possess a high intellectual potential that allows them to create unique competences and build assets are able to secure certain competitive advantages for themselves.

The aim of our study is the identification of the system of effective interaction between government and universities, enterprises and businesses and various research centers and growth areas and the main objectives of this interaction that involves the modern information technologies in the context of modernization and development of innovative activity in the region.

Main Part: We can say that the process of modernization and innovation began in 2009 with the adoption of the Federal Act no. 217 of the Russian president and the State of the Nation. During 2010 Russian government organized several competitions for the additional budget funding of innovative capacity of universities (RF Government Decree no. 219, 220).

The most interesting event was the so-called "Megagrant Competition," in which out of the more than 500 prominent Russian and foreign scientists the government commission selected 40 winners, each of whom received 150 million rubles for three years for the establishment and development of world-class laboratories.

Many top universities have got seriously involved in the organization of small innovative companies, the authorized capital of which includes the results of intellectual activity, mainly the know-how's, software, databases, etc.

Some regional governments are stimulating innovations in their own territories, relying primarily on the regional universities. In recent years, strong universities follow a well-known model of the innovation economy development - the Triple Helix.

Triple Helix is built between universities, industry (possibly business) and government and facilitates the reorganization and strengthening of institutional mechanisms and incentives for innovation, all that creates some kind of "innovations within innovations" situation. In these circumstances, the role of clusters is increasing.

Innovative development implies a third way, as opposed to administrative and fully market ways, it is a management model - a cluster, which gives the key participants of clusters - the state, enterprises, university, business the ability to take lead at a certain stage of development and at the same time forms a common cluster space agreement.

The source of this model is a university. One of the key functions of the university in the cluster model of the Triple Helix is conducting research and development and scientific activity. On the other hand, the university should be entrepreneurial both in the educational process and in the regulations and management procedures [4].

Preparing education system ready for all the challenges of the XXI century requires certain modification of a system based on the use of modern information technology. The main hopes are put on the establishment and maintenance of information and educational environment of open and distance learning, the development of new object-oriented technologies for

creation of the databases of educational materials, along with the development of traditional technologies for the development of electronic textbooks and multi-agent technology in education portals. Today, information technology and education are the two tendencies, which together become those areas of human interest and activities, which mark the era of the XXI century and should become the basis for solving the problems that mankind is facing.

In the light of the foregoing, a new direction - information technology in education - begins to take shape. This sphere includes the problems of intelligent training systems, open education, distance learning and information educational environments. This field is closely related, on the one hand, to the pedagogical and psychological problems, but on the other hand, to the results achieved through the scientific and innovative activities, such as:

- C Telecommunication technologies and networks;
- C Computer processing systems, visualization of information and human interaction;
- C Artificial Intelligence;
- C Automated modeling systems for complex processes;
- C Automated decision support systems, structural synthesis, etc.

The range of issues included in the topic of information technology in education in the context of innovations it is extremely broad. In the context of innovative development, cluster universities should serve not only as sources of knowledge, but also train professional administrators who can manage the acquired knowledge. [5]

In addition, the cluster model of the triple helix implies the priority of the network nature of the interaction between participants in the innovation process in the framework of the so-called strategic innovation networks, where occurs the intersection of three types of cluster interaction - corporate, government and university and the creation of hybrid institutions on their basis.

It is this cluster model that has the right to life in our country as well, unless the leadership role in the formation and development of new innovative system will be taken by the strongest universities, mainly, the national research ones. The experience of foreign countries with developed economies shows that the cluster approach, which was originally used for the development of competitive advantages is now increasingly being used for the development of innovative programs [6].

Right now, when a new strategy of innovative development of Russia up to 2020 is being discussed, it is necessary to strengthen the role of the strongest Russian universities in its implementation.

Since 2000, the country has seen periodic surges of discussions on the issue of the reform of the national education system. Some things that came out of such discussions have been implemented, for instance the Priority National Project "Education" for 2006-2008. But all this can be called a warm-up. Apparently, only by the end of the decade the image of reform has been finally shaped and goals and mechanisms for its implementation have been defined.

There are still many problems, but it was only by the end of the decade when the administrative drivers gained speed and chose a definite direction. It is hard to define what causes these changes, but perhaps the crisis state of the economy vividly demonstrated an extreme degree of underdevelopment of the national education system compared to the systems of world leaders and mobilized it to act against long and not always productive discussions and reflections.

It was in 2010 when a new and radical reorganization of the Ministry of Education took place. This reorganization should result in the effective management of the triune whole - education, science and innovation. The Government has introduced the mechanisms of incentive for the development of science and innovation in universities, launched an implementation of modernization projects, whereas there is really only one project worth speaking about, called Skolkovo, but it is the precedent created that is important, a new federal program of education development has been adopted for the next five years.

Not least important is the improvement of the effectiveness of the professional training for the implementation of the tasks of modernization of the national economy.

Each university faces a daunting task of forming a new management, engineering and technical generation, capable of providing innovative development of Russia and speaking in terms of the aforementioned strategy of innovative development - creating an innovative person.

The concept of long-term social and economic development of the Russian Federation, approved by the Executive Order no. 1662-r of the Government of the Russian Federation on November 17, 2008 provides for the establishment of a network of regional industrial clusters, capable of implementing the competitive potential of the territories and the formation of a number of innovative high-tech clusters.

According to the Guidelines for the implementation of cluster policy in the constituent entities of Russian Federation issued by the Ministry of Economic Development, the development of regional clusters in Russia is one of the conditions for increasing competitiveness of the domestic economy and the intensification of the mechanisms of public-private partnership.

In this connection it is necessary to highlight the priority of strengthening the independence and competence of the regions by state initiatives and development.

Indeed, many regions that were once the centers of large enterprises have undergone significant changes, lost their traditional industries and are being forced to reorient their activities in the area of intangible or knowledge-based production.

In our region, in the field of regional innovation policies there have been created certain administrative structures that govern the innovative development of the region. The main condition for the effective functioning of innovation at any level is a close and effective interaction between science, education, finance, strategy of regional government, as well as networking interaction between enterprises, businesses, etc.

At the same time innovations are perceived as a completely new product, technologies, facilities and new knowledge, constitute the product of several clusters - regional administration, universities, private companies, research institutes, industry, etc. and are distributed through the network of relationships in the common economic space of the region which further creates the conditions for an efficient combination of production factors and production of innovations.

The establishment of networks in the region is aided by the proximity of inbound clusters, unified infrastructure and the general social, cultural and other conditions. It is these networks as a system for sustainable interaction of innovation cluster that provide the development of new technologies and scientific and technical potential of the region. Innovation networks do the most effective job in specific social, economic, natural, cultural, historical conditions and generate innovative type of economy, based on close cooperation between producers and consumers of the regional scientific and innovative products. The presence of innovation networks will allow the innovative market participants to learn about the capacities and requirements of each other, to adapt to them, thereby lowering the costs of competition.

For the implementation of regional innovation, science and technology and industrial policy the region should create functional innovation networks, reinforcing regional specialization and growth of clusters in order to improve its competitive advantages.

The government of the Nizhny Novgorod region faces the most important task - to change the structure of universities and small businesses with the help of cluster policy. This is only possible with financial support from the Regional Government as well as with the support from the federal centers of cluster development. And it will act as a trigger that will activate the cluster policy and research on issues of state regulation of the cluster as a whole.

Comparative analysis of the impact of information network technologies on the formation of production and market processes in the region is also relevant. This will make it possible to analyze the existing model of the Russian information network economy, to show the region's role in the development of an information system and in a reorientation of the Russian economy towards the innovative model of growth.

The demand for cluster programs should reflect the priority position of the clusters in the development of a certain region. The clusters further will be able to ensure the competitiveness and prosperity of any region. Without a set of measures to strengthen the economic potential of any entity of the Russian Federation, including actions to improve the innovative attractiveness, the formation and improvement of the clusters, promotion of regional growth points, it will be impossible to achieve the effective implementation of the strategy of social and economic development of a certain region of the country.

For the Implementation of Cluster Policy in Our Region, We Believe it Is Necessary To:

- C Identify key objectives and principles of creating a cluster, subjects, types and stages of development of the cluster.
- C Formulate principles and objectives of cluster policy, measures for its implementation; conduct a separation of powers in the implementation of cluster policy between the federal and regional levels of government.
- C Elaborate mechanisms of support by the Nizhny Novgorod regional administration and the Government of the Russian Federation: targeted distribution of the allocated funds, funding of specific activities.

- C Provide information support for cluster policies and activities of the cluster.
- C Develop the cluster brand.

The main positive component for the cluster members will be the opportunity to receive the state support for the implementation of the projects. Universities will be able to adapt to the needs of the regional administration and business structures as cluster members in the field of training of specialists with the necessary professional competencies, as well as in the planning of scientific research programs for science schools, with respect to the regional cluster.

The Government of the region will be able to facilitate the research on the topic of the development of the infrastructure in the region, expand the potential of international cooperation, upgrade production facilities, accelerate innovation, exchange knowledge, promote the sales of innovative products with the help of information and communication services, increase the number of taxpayers, reduce dependence on individual business groups etc.

Participation in a regional cluster will allow enterprises, small and medium-sized businesses to significantly reduce barriers to market through specification of requirements within the cluster itself, increase the efficiency of procurement of promotional information products, develop personal image through positive reputation of the cluster members, improve the human resource infrastructure and gain access to the international markets [5].

State support of any innovation cannot be built without taking into account the features of a region and the competitive advantages of specific areas. It is impossible to develop and implement a system for the formation of innovative clusters without the participation and support of business.

Three institutions participate in the creation of innovative regional clusters - academic, corporate and government. Their innovation policy is aimed primarily at generating entrepreneurship and new business. The principle of triple helix - a joint activity of universities, industry, business structures, as well as the state - is currently used as a base for creation of new areas of innovation development.

In this case the main role in these processes is assigned to the universities. Cluster universities should have a sufficiently broad and well-defined range of research projects. The demand for educational services currently exceeds supply. Limitations of the supply of

educational services are largely determined by the lack of qualified trainers. Among other problems of education we may point out the difficulties with keeping up the training materials up-to-date, their adjustment to the needs of learners and the dynamics of development of areas of knowledge and new technologies. Traditional methods and teaching tools today are insufficient to meet the increased requirements for the training of graduates of higher education. High rates of technological progress lead to the rapid obsolescence of knowledge for professionals working in the industry, which makes it necessary for them to continue the educational process throughout the active period of life. The answer to increasing demands for education is the emergence of the concept of open education. The overall aim of public education is to prepare students for full and effective participation in the creation of new regional research and innovation clusters in the information society. Open education is based on a number of fundamental principles, which include the student's freedom to choose the university, time, place and pace of learning and to plan his or her curriculum. It is assumed that open education will improve the quality of education and resolve the contradiction between supply and demand for educational services.

The Principles of Open Education Can Be Implemented Only Through the Following Distance Learning Methods:

- C Case technology - in which the student receives a set of teaching materials (case) and studies them, with the possibility of periodic consultations with university trainers, members of the cluster.
- C TV technology - in which the basic training procedures are based on listening and watching the recorded lectures.
- C Network Technology - in which the access to educational materials and consultations with trainers are available through the telecommunications and computer networks. Usually, the Internet is used as such a network; this type of network technology is called the Internet-technology or Web-based technology.

As for the relationships between government and citizens, government and business, government and education, university and business, university and enterprise, etc. here there is a significant asymmetry of information in these aspects. The state controls large bulks of such information. In the analysis of information

businesses (consulting, information brokering, marketing services, analytics, development of software products, providing access to the hardware) we can note a steady growth. In our region, there is rather a complete picture of all the opportunities becoming available through the use of new networking potential of information technology for solving various problems in all areas. There has also been some groundwork on creation of telecom infrastructure conducted and a certain minimum level of equipment of universities, government agencies and social institutions with computer and network equipment reached. Advances in informatization have been attained through the use of foreign equipment or equipment assembled in universities with the support of grants, projects, etc.

Informational advantage in each region should be an important factor in redistribution of economic and political resources. Innovations are the important element in the information economy of the region. On the one hand, they are formed under the influence of information and service market and on the other hand, they cause the emergence of the information market and dominance of service industry. The role of innovations is increasing due to competition. In a market economy of any region, innovations can help both new companies and successful ones gain competitive advantages. The dynamics and quality of economic growth in the region increasingly depend on the technological changes in the innovative economy.

The role of universities in the development of regional innovation system is associated with the development of the following activities:

- C Reproduction of scientific and technical (intellectual) capacity for the development and commercialization of innovations;
- C Manufacturing of innovative products and services "in the house";
- C Incubation and generation of small high-tech companies associated with a particular university;
- C Creating of innovative infrastructure that serves the needs of the regional innovation system;
- C Training of specialists for regional research and education clusters;
- C Creating of an innovation culture in business structure.

Proactive attitude of cluster universities in the development of all these activities with access to the new information technologies will help create centers of innovation activity of the regional cluster and the institutional framework for regional innovation policy.

One form of organization of innovative activities is the model of creation of regional science and innovation clusters. At the same time setting the priorities in research and innovation activities of any cluster university as part of the socio-economic environment is impossible without achieving the two management objectives:

- C Development of management algorithms for these regional science and innovation clusters, i.e. monitoring of innovations in the field of science, technology and education;
- C Development of a system of indicators, criteria for the evaluation of information for informed decision-making in the state regional innovation policy and developing innovative strategies for the university.

At present, this objective is not achieved, which makes it difficult to develop evidence-based proposals and solutions to enhance innovative activities in universities. The accumulated experience of universities and innovation potential require a structuring, university produced content and search of new forms of scientific activity organization. The regional research and innovation clusters could become such kind of a new form, which will result in innovative actions that will lead to a formation of a set of work processes for the development, implementation and practical use of inventions.

In this case, in terms of the degree of novelty, both types of innovation can be used: the radical, so-called basic and ordinary, so-called improving. Basic innovations radically transform the opportunities to meet social needs, because they are based on a new scientific knowledge; and ordinary ones improve the knowledge through certain quantitative and qualitative changes.

Division of innovations into ordinary and radical ones corresponds with the two main forms of scientific and technological development of any production:

- C Evolutionary form, which consists in continuous improvement of products and processes in order to ensure their rapid adaptation to constantly changing social needs of production;
- C Revolutionary form, based on previously unknown fundamental knowledge and practical implementation of new ways to meet social needs.

For the effective implementation of the innovation process it is necessary to achieve an integrated unity on all stages of innovation, since any of them could undermine the results of the innovation process.

From the perspective of the personal aspect, the innovative activity is an activity aimed at transforming the whole complex personality of the subject, which provides not only the adaptation to the fast-changing professional environment, but also the possibility of influencing it.

Today there is a question of the development of industrial science in universities, that is, development of scientific schools of the leading scientists working in the education system. Modern regional research cluster university is an intellectual, emotional and valuable open community of scientists from different branches of various levels, who collectively develop research projects. An essential feature of a cluster university is that it simultaneously implements the functions of a research university, production, distribution of innovations, the protection of scientific ideas and training of young scientists. Scientific schools have played an important role in the development of innovative potential of the modern university research`activities.

Cluster universities should create an institutional mechanism that will be responsible for the technological implementation of basic research, assessment of markets for future innovative products, promotion of high-tech and innovative products.

Cluster university must work in an environment of advanced entrepreneurship and invention development. It is the environment where the simple linear model of innovation is being replaced by the more complex one. The task of the university-business relationship is to systematize the process of commercialization of research results. A working dialogue between the university and business is required to have the research, focused on the needs of industry [5].

Whereas at the core of this new form of communication organization of a regional cluster lies not the information itself, but the network structures, which give the disseminated information its special qualities and features, that trigger the system-wide transformation of all major areas of human activity - from the economy and politics to education and culture. Networks are both the means and the result of the globalization of the cluster. These same networks shape a new social morphology of the society and the spread of the network structure significantly affects the course and the result of the processes associated with the production, daily life, culture and power. The leading role in regional clusters in the field of ??network structures must belong to a computerized information communication lines that permeate the entire social life of contemporary society in different directions - horizontally and vertically, within individual countries or regions and transnational, forming

an expensive network of communications, functions of which are often compared to the functions of the nervous system, that controls organisms.

Despite the diversity odd views, we can identify some general basic features of the regional research information clusters:

- C The changing of the role of information and knowledge in a regional cluster, expressed primarily through the unprecedented growth of information saturation of economic, administrative and other activities, through transformation of the information and knowledge into the most important resource of the socio-economic development;
- C The transformation of the information industry of the region into the most dynamic, profitable and prestigious area of ??production;
- C The emergence of a developed regional market infrastructure for the information consumption and information services;
- C The increasing computerization of regional clusters through a telephone, radio, television, the Internet, as well as through traditional and electronic media;
- C Creation of a global information space, which provides: effective information interaction of clusters, their access to global information resources and meets their needs for information products and services;
- C Profound changes in patterns of social organization and cooperation of regional clusters, in the conditions there is a replacement of centralized hierarchies with flexible, networked clusters that are adapted to rapid change and innovative development in all spheres of society.

Thus, we can say that the rapid development and dissemination of new information and communication technology brings dramatic global changes in the information area. Its revolutionary impact affects government structures and civil society institutions as well as the economic and social sphere, science and education, culture and individual lifestyles. Information and communication technologies are becoming an important stimulus for the world economy as a whole and for each region in particular. They are one of the most important factors in ensuring of the functioning of global markets, information and knowledge, capital and labor. In these circumstances, the famous phrase, "Who owns the information - owns the world" takes on a whole new meaning and becomes more relevant than ever before.

We believe that the Nizhny Novgorod region is one of the leaders of innovation, has a high rate of commercialization, uses a large number of advanced technologies, produces innovative products, utilizes networks and that the regional authorities can create innovative cluster in our region.

The magnitude and dynamics of innovation depends not only on the presence of certain formal organizations in the region, but also on how they will interact with each other as a collective system for creation and utilization of knowledge and on their compliance with the values, norms and other criteria. Only when the Nizhny Novgorod region has all the original components it will become possible to create a regional research and innovation cluster.

And the creation of regional research and innovation cluster as one of the Russian centers of competence on the basis of the National Research University (UNN) completely corresponds with the essence of the concept of sustainable development, both in our region and in the entire country. Lobachevsky State University of Nizhni Novgorod for several years has been interacting with both the Government of the Russian Federation and the Region and with the industrial sector, businesses, research centers and research institutes, public and private organizations, etc.

University staff conducts research in the major areas of exact and natural sciences and humanities.

The University has developed dozens of world-renowned scientific schools. The founders of UNN scientific schools are considered the most prominent scientists in Russia. UNN is the base university of the Nizhny Novgorod Science Centre of the Russian Academy of Sciences. With the development of information technology and a growing number of Internet users, networking technologies are becoming increasingly more popular in the university. Distance education of UNN students through network technologies is based on the access of students to pre-established databases of training materials. The used network technologies also include audio- and videoconferences. Unlike TV technology, the video-conferencing provides the opportunity for bilateral exchange of information. Students not only listen to the lecturer, but they can ask questions and get answers. Although direct communication with the teacher is an undoubted advantage of video-conferencing, its organization is expensive, requires the presence of students at a

particular time in special facilities equipped with videoconferencing hardware. Therefore, the main training procedures involve the use of training systems and electronic educational materials.

In our view, the creation of National research universities on the basis of leading universities is an essential element of optimization of scientific and educational system, which is most favorable for the further development of regional science and innovation clusters.

Using UNN as an example we can highlight the following functions of a university as a national research university in the regional science and innovation clusters:

- C Training suitable for the current level of development of science, both in theory and methodology.
- C The graduates should master a paradigm of the corresponding discipline or multiple disciplines, as well as the methodology of scientific analysis of the emerging professional challenges and methodology of the scientific search for their solutions.
- C Possessing a fundamental style of thinking, the experts of this level, starting their professional lives, should be able to change the content of professional work.
- C Making research a priority fundamental function should be the institutional specifics of cluster research universities [6].

University science as a key element of the scientific potential of the country largely determines the quality of highly-qualified specialists' training in higher education. The basis of the scientific potential of the cluster university consists of highly qualified staff. As we have noted, under the current conditions of the recovery of the domestic industry, the training of a new generation of highly qualified professionals, as well as the development of innovative forms of activity that contribute to or directly bring additional funds necessary for the further development of the national education system, has become an urgent task for higher education.

The development of innovative activities in universities is directly related to the implementation of an effective regional policy. Nowadays the ability to analyze, select and offer services in order to address the most fundamental and urgent problems of the regions gradually becomes more and more important. And it is the cluster universities that should be first to offer the regional

government the most thorough scientific, technical and pedagogical potential for solving complex problems in the field of the restructuring of industry, environment and tackling the social and other issues in the regions [7].

In this regard, the cluster universities put a spotlight on the new opportunities associated with market relations. The most important source of income for sustaining and development of the state university is its extra budgetary research which as of today provides more than 50% of the revenue of the university consolidated budget. It used to play an important role in the state university system, but in the context of transition of higher education to the system of market relations it has consistently increased its value.

In a competitive environment, in circumstances where there is a state order for the training of specialists and for basic and applied research, there is a need for the creation of additional sources of extra budgetary funding of universities, allocated for the development of both teaching and research and innovation processes, for the support of socially important activities of the university, for the improvement of the quality of life for employees and students.

Under these conditions there occurs a partial transformation of the university as a consumer of budgetary resources into the innovative entrepreneurial university, the educational services and scientific and innovative products of which are competitive and demanded [8].

The task of a cluster university is to provide a balance of market and non market trends by strengthening the unity and integrity of the university through the improvement of the management structure, on the one hand and through more diversified and flexible system of financing, finding of alternative resources, motivating university faculty to actively participate in research work within the market orientation, on the other hand.

As shown by the research experience of Lobachevsky State University of Nizhni Novgorod, the National Research University, the support of existing and creation of new university research projects with an innovative focus and a perspective of the real economic effect can be provided through:

- C Strengthening the scientific school and sustaining of the scientific potential of the university;
- C Improving the educational process, increasing the level of undergraduate and graduate students training;
- C Creation of new jobs for universities researchers, which allows for additional cash flow opportunities.

Our study gives us a reason to conclude that the regional science and innovation university cluster is an open system, a research and educational corporate system consisting of a complementary public, scientific, educational, industrial and other modules, the basic principle of operation of which consists in the continuous updating of the educational and research processes. Education and research in the cluster university should be regarded as equally important and legitimate functions of the National Research University.

We would like to point out the fact that a university as a part of a regional science and innovation cluster is different from a teaching-only university, but it also differs from research organizations engaged in research only. It integrates these two functions, i.e. simultaneously produces both knowledge in the form of theories, principles, facts and specialists that can develop this knowledge and use it. Given that the demand from regional administration and industry for new knowledge depends not only on purely economic factors, but also on the presence in the industrial sector of specialists, who can recognize the potential of a new knowledge, evaluate and implement it, we must admit that the role played by such a university in the innovation process is unique. At each new stage of development of science and technology, it creates and supplies knowledge as well as provides the demand for it.

We should note that the universities, being a part of a regional science and innovation cluster, not only fulfill the orders the regional administration, but also act an independent object and a subject of scientific and industrial policy by actively participating in the creation, transfer of knowledge and technology in different forms and by fulfilling significant cultural and regulatory functions, participating in the formation of values and social orientations and by possessing a unique intellectual potential, which means they can and should participate not only in many scientific and technological projects but also in the social ones. Regional cluster universities, as shown by our study in a modern, multicultural educational environment, are the leading generators of social change and they actively participate in the formation of a new political culture and contribute to the stability of social relations. The decision to conduct certain activities in the regional science and innovation cluster should be made with respect to the characteristics of each individual project. The main criterion, in our opinion, should be compatibility with the basic objectives and functions of the university. It makes sense in this case to formulate conditions that guarantee the protection of university interests: the right of the researchers to

publish the results of their work, the right for a reasonable remuneration, the right of students for full, high quality training and research, etc. [9].

Innovative activities in the university require a systematic approach, support and management. University, relying upon its highly competent scientific staff, carries out the technological, economic and social innovation and, in the context of modern information environment, creates the product that meets the standards of world science and makes it competitive. Management of the integration processes and organizational forms is based primarily on a set of incentives that support the establishment and functioning of scientific research universities. The integration of universities, academic research institutes into the scientific innovation clusters with the support of the administrations of Russian regions serves the interests of society and state, as well for the rationally understandable interest of science and higher education. Therefore, this corporate union has the right to choose the form, pace and specific partners for the integration and within the framework of mutual agreements should create the necessary conditions for the implementation of the aforementioned right.

In our opinion, such a corporate activity in the regional cluster universities should be based on the following principles:

- C Universities need to set the goals, the achievement of which is desirable for national interests;
- C Universities should focus on criteria of priority of public support on federal and regional levels;
- C The regulatory impact of the state should adequately correspond with the new conditions of operation of science and industry;
- C Universities should increase the return of state investments in science and education;
- C Universities should continue to provide the national economy with new ideas and innovation-minded professionals.

The Following Changes Should Take Place in the Universities:

- C June 5, 2013 Change of the disciplinary structure of research, particularly the enhancement of education and research in the areas of knowledge that constitute the basis of high-tech industries that in turn constitute the basis of any viable national economic entity.
- C Change of spatial structure of national capacities, namely, strengthening of regional scientific and educational centers.

- C Creation of the conditions for fair competition. In a dynamic society the elite, including university elites, is not a closed group, the privileges of which are artificially protected, but an open community, which accepts any subject who has attained success and acts in accordance with accepted professional standards and policies.
- C The need for selection of strategy. According to this the main goal of any university is to determine its competitive advantages and start developing them or, in case the university does not have any advantages yet, quickly begin to create and develop them. If the university achieves the best results in the region or country at least in one of its preferable areas, its survival in a competitive environment is likely guaranteed.

The functioning of the system of regional research and innovation cluster in the university is not an end in itself, but serves the purpose of formation and development of students as creative individuals capable of reasonably and effectively addressing the emerging problems. Accordingly, the activities of these universities regarding the discovery and development of potential personal skills and creative abilities of the students should become the priority in education and training system. Having proclaimed the priority of the individual in the life of modern society, we should proceed from the premise that each individual is potentially gifted and we must provide everyone with the opportunity to discover their talents and find oneself.

The most important task in the implementation of this provision in higher education consists in engaging the majority of students into the activities of regional clusters, the authority of which should be engrained starting from school. The educational process in the university should be a synthesis of learning, work experience and students research. At the same time the transformations in the system of education should be based not only on elaboration of new ways and methods of development, which is certainly important, but also on the use of long-term domestic and foreign experience of training that meets international standards.

The current economic situation in the country, rebuilding of the structure and content of higher education, development of academic and economic autonomy of the universities, makes clear the necessity and urgency of drawing up guidelines for the organization and funding of higher education in the context of the new conditions of their operation.

Formation of a powerful integrated research and education sector in Russian science and higher education as a combination of the leading scientific and educational institutions with the appropriate status, state, business or other support, may have multiple variants and be implemented in several relatively independent ways.

It is advisable to consider our proposed structure of regional research and innovation cluster as a leading, elite, national higher education and research institution to be the common view of the nature of scientific and educational structures. This is a national center for training of specialists and conducting the top-priority research with a strong role of fundamental and strategic applied works, innovative and research nature of learning, the organic unity of research and educational process, that features a permanent large-scale growth of new knowledge, as well as a high number of competitive developments and services in domestic and world markets of education and high technology.

It is obvious that in today's Russia only a few scientific and educational structures can meet such standards, but it is these structures that can and must become engines of reform and development of Russian science and higher education, the basis of its active and meaningful integration into the European and world science and education [7].

Therefore, given the magnitude of the task, the formation of these structures should be conducted with a high-priority government support both on the federal and regional level, in stages, in the following areas:

- C Targeted high-priority support, reinforcement of current state of affairs, modernization and integration of science and learning process in leading Russian classical and technical universities, equal nr close to the level and model of research and innovation university.
- C Regional association of universities, capable of adapting to each other and work better jointly to adjust to a changing external environment. Though, the new university can establish new interdisciplinary teaching and research centers and more effectively develop various integration processes. Essentially, this is the way of regional institutional concentration of university research, training and innovation capacity within a single integration structure.
- C Initiation, support and encouragement of the integration processes between government, higher education, applied industrial science, industry and business by the state and regional authorities.

Creating a data network of regional clusters in the Nizhny Novgorod region will allow to seamlessly combine the solutions for two basic interconnected issues in the regions: the implementation of major federal and regional economic and scientific programs and training of highly qualified specialists for scientific and industrial complex. Moreover, this creates for regional universities certain competitive advantages against higher education institutions of the Moscow region.

Anticipating the increase in the overall scientific innovative entrepreneurial capacity of major scientific and educational structures, it is advisable to promote the development of new forms and programs, including their scientific and educational development, researchers and trainers within the scope of technology transfer and innovative entrepreneurship.

Such integration requires the formation around the major scientific and educational centers of a network of innovative business structures - scientific and technological parks, business incubators, engineering centers, etc.

- C The development of innovative scientific and educational activities, scientific and educational transfer.

The fact is that in the context of a qualitative renewal of the national economy and social consciousness, the skills of innovative thinking and innovative nature of the work become one of the key, critical attributes of specialists. Hence appear the new strategic and tactical goals of the renovation of the system of higher education, new requirements for the management of this system at all levels [8].

Accordingly, the university should become a dynamic, innovation receptive, extensive research and educational system, that operates on the principles of normative state support, self-regulation, selectivity, multi-subjectivity in terms of types of ownership and organization in order to provide training of specialists that meets the needs of the state, market-oriented economy and the international qualification requirements.

Modern Russian higher education, every major university, especially National Research University needs a constant and effective scientific base, the system of scientific and educational transfer and innovative and educational management, which would create all the conditions necessary for strong motivated scientific innovation and educational activities of trainers and innovation and research nature of education in the university.

And, in our opinion, in our region, Lobachevsky State University of Nizhni Novgorod meets all the necessary requirements.

In 2010 - 2011 UNN has won four projects dedicated to attracting of leading scientists to the Russian institutions of higher education.

The main objectives of the projects, including the objectives of creating conditions for the creation of regional clusters include: creation of a world class university research laboratory, achievement of innovative world-class scientific results, training of highly skilled professionals and transfer of promising research results into the economy. [9]

Lobachevsky State University of Nizhni Novgorod - National Research University is currently the following projects:

C "Extreme light fields and their applications" - supervised by the Department of General Physics of the Faculty of Radiophysics (co-director of the project from the UNN side is Professor M.I.Bakunov). The project includes an invitation of a well-known French-American researcher in the field of laser physics, director of the Institute of Extreme Light Fields in Paris, Professor Gerard Mourou for research work at UNN and the establishment of a world-class laser laboratory under his leadership.

On the basis of the new laboratory UNN plans to deploy extensive experimental and theoretical studies of the generation of light fields with extremely high peak power and extremely short pulse duration, the interaction of such fields with matter, as well as the development of a compact sources of THz, soft X-ray and ultraviolet radiation for applications in biomedicine and creation of new security systems.

C "Extracellular brain matrix" - supervised by the Department of Neurodynamics and Neurobiology of the Faculty of Biology (co-director of the project from the UNN side is Dr. Sc. V.B.Kazantsev). The project will be implemented in the Nizhny Novgorod State University under the supervision of one of the leading scholars in the field of brain science, the creator of a new trend in neuroscience in studying of the synaptic function of the extracellular matrix in the brains of mammals, professor of the Italian Institute of Technology (Genova, Italy) A.E. Dityatev.

The solution of the objectives of the project will allow creating a modern scientific and educational brain science center in UNN and bringing the university research to one level with modern scientific standards.

C "Radiophysical principles of biomedical technologies, medical instrumentation and acoustic diagnostics" - supervised by the Department of Acoustics of the Faculty of Radiophysics (co-director of the project from UNN side is Professor S. N. Gurbatov). The project includes an invitation for scientific work in UNN of a prominent Russian scientist in the field of nonlinear acoustics, head of the department of acoustics at Moscow State University academician O.V. Rudenko and creation under his leadership of a laboratory of "biomedical technology, medical instrumentation and acoustic diagnostics" - (MedLab), which will support the research and provide the coordination of the departments of the university in the following areas: acoustic diagnostics and high-intensity ultrasound, laser and microwave medical devices.

During 2011 - 2013 MedLab will conduct fundamental research in order to develop medical devices, the production of which as a result of the project will be undertaken by Russian enterprises and particularly, the enterprises of Nizhni Novgorod region.

C "The interaction of the atmosphere, hydrosphere and the land surface: the physical mechanisms, methods of monitoring and control of the planetary boundary layers and the quality of the environment" - supervised by the Department of Electrodynamics of the Faculty of Radiophysics (co-director of the project from UNN is Professor A.V.Kudrin). This project will be implemented in UNN under the supervision of one of the leading scholars in the field of atmospheric physics, Director for Research of the Department of Atmospheric Sciences at University of Helsinki, Professor of the Finnish Meteorological Institute S.S. Zilitinkevich.

The project involves the creation of a world-class laboratory at UNN, the activities of which will be focused on comprehensive studies of physical processes in planetary boundary layers in the atmosphere and hydrosphere, as well as the design and construction of equipment for monitoring and control of the environment.

The achievement of the objectives of the project will create new opportunities for advanced research and development in the field of earth sciences and radio-physical methods of investigation of natural environments in UNN, provide a problem-oriented highly qualified training for the number of UNN undergraduate and graduate students working and studying in this field, create the conditions for the accelerated integration into the international scientific community.

In 2010, UNN became the winner of the contest of Russian Federation Government Decree # 218 "On state support of a high-tech industries", in which UNN and "Volgostalkonstruksiya" Company will jointly implement the project called "Creation of a mobile high-tech plant for processing and refinery of waste (acid sludges). Production of a new generation of binders for asphalt-concrete mixes (bitumens)". The PI for this project is Professor A.D. Zorin, (Faculty of Chemistry, UNN). The project was designed by the UNN Center for Network Integration (Head of the Center is Professor Igor Orlov).

One of the first Russian centers for research and education in the field of nanotechnology called "Physics of Solid-State Structures" was established in UNN in 1998. The center is equipped with unique equipment located in its four laboratories.

In 2007, UNN has established a research and educational center called "Nanotechnology". These two centers act as hubs for the development of advanced technologies, ensuring the transition from research and development to the introduction of new technologies into production. Nanotechnology centers of UNN in the next few years should become the growth points of the innovative economy.

Nizhny Novgorod State University is developing the infrastructure for the support of knowledge transfer, including a system of interaction with external companies, organizations and academic institutions. University has a special center dedicated to this purpose called Innovation Technology Center.

Research is being conducted in cooperation with major research centers of the Russian Academy of Sciences, the Russian and foreign research and innovation centers and high-tech enterprises ("Gazprom", "Rosatom", "Intel", "Microsoft", "National Instruments", "Mera", "Teleca" and others).

In 2010, UNN's program "Development of an integrated innovative infrastructure of Lobachevsky State University of Nizhni Novgorod (National Research University) for the effective transfer of research results

and developments into the real economy," won an open contest for the programs of the development of innovation infrastructure, including support for small innovative businesses, federal educational institutions of higher education. The competition was organized by the Ministry of Education and Science of the Russian Federation in order to create an innovative environment and develop the cooperation between educational institutions and industry.

It terms of development of educational activities UNN 11-13th out of 57 universities of the RF Rating system activities [10].

In terms of development of research activities, Lobachevsky State University of Nizhni Novgorod takes the 15-18th place in the university ranking system [11].

In terms of the level of social activity, UNN takes 11-14th place, which confirms its being in demand among other higher education institutions of Nizhny Novgorod region.

In terms of the level of internationalization of UNN takes 20th place in the university ranking system.

In terms of brand development UNN is in 23rd place in the Russian university ranking system [12].

In 2011, UNN joined a federal targeted program "Development of the Pharmaceutical and Medical Industry of the Russian Federation until 2020 and beyond."

The aim of the project is the creation on the basis of a national research university (UNN) of a Growth Zone for medical equipment production and high biomedical technologies, as one of the Russian centers of competence, which has a market share and competitive advantages in the sectors corresponding with the objectives of its scientific and innovative development.

Growth Zone for Medical Equipment Production is a medico-biological cluster. Growth Zone includes five specialized divisions - educational, research, medical, manufacturing divisions and the division of Small Innovative Businesses, created as an integrated solution for the modernization of the domestic medical equipment production and development of innovative activities in the Nizhny Novgorod region and Volga Federal District. The creation of the growth zone on the basis of Lobachevsky State University of Nizhni Novgorod can and should be viewed as an adequate response to the changing requirements of the country's leadership to be met by UNN as one of national research universities in Russia.

The existence of the growth zone in Lobachevsky State University of Nizhni Novgorod corresponds with the state innovation policy of Russia, proclaimed by the government as a strategic tool to ensure economic security and achieve high growth dynamics of the economy of our country and demonstrates the willingness of the authorities at all levels to provide full support to the processes of integration of intellectual potential of higher education institutions and joining the efforts of educational, research and industrial institutions to create structures similar to the growth zone, such as regional science and innovation clusters.

CONCLUSION

In order to achieve the scientific and educational objectives UNN cooperates with public authorities and local governments, cultural and social institutions and organizations, industrial enterprises, other universities, the various centers, etc. which confirms the existence of all conditions and subjects necessary for the creation of a regional research and innovation cluster. Lobachevsky State University of Nizhni Novgorod in this case generally acts as an integrator of knowledge in the region.

Regional Research and Innovation Cluster converts the new knowledge into economic, social and environmental benefits.

The analysis of the interaction of executive and legislative authorities, universities, business structures and enterprises, research centers and growth zones in the context of the establishment of a regional research and innovation cluster has shown that its implementation is aimed at solving current tasks of creation in the Russian Federation of a network of specialized innovation clusters for complex solution of the issues of economy modernization [13].

Concepts of development of high technology used in the implementation of the project on the establishment of a regional research and innovation cluster are systemic by nature and consistent with modern views on the construction of innovation systems.

In accordance with the foregoing, the concept of innovative modernization of the Russian system of education into regional clusters involves both structural and institutional reorganization of professional training and production of innovative products. During the course of the implementation of this concept it is necessary to identify ways to integrate primary, secondary and higher education, the development of multi-tier education, which

is most effectively implemented in the regional university clusters, areas of responsibility of which are defined by the boundaries of the territorial economic entities.

The activities of regional clusters will allow for the coordination both on the federal and regional and local levels of adoption of policies in order to create conditions for the development of economic sectors and social sphere and the formation of clusters of advanced economic growth with respect to the competitive advantages of each region. It is the steady increase in the quality of life of the country that should be an indicator of the success of the implementation of state regional policy.

RESULTS

The study yielded the following new results:

- C The necessity of harmonization of formal and informal institutions in the context of the legitimization of policies and procedures of interaction between government, universities, business structures and enterprises as an essential condition for the formation of the effective system of interaction has been proved;
- C The mechanism of interaction of cluster structures, as a set of principles and methods, as well as economic and legal forms and technologies, organizational structures within which the relations between political, educational and economic power in the region are being established has been determined;
- C The barriers to the establishment of an effective mechanism of interaction between government, universities, enterprises and business structures in order to attract investment to the region has been identified and ways to overcome these barriers primarily consisting in the quality reforms of the relations of power in society have been validated;
- C The main objectives of reforming the state support of universities, companies and businesses, which are: the formation of an optimal environment for the development of education, industry and business, regulatory effect on the internal environment in the form of financial support, organizational self-improvement of the state support have been substantiated.

C The mechanism for market integration of the technologies into the regional cluster, based on institutional design has been defined - it is a priority component necessary for the concentration of national intellectual resources in order to address the systemic problems that arise before the government of the country and the region in a more obvious shape.

REFERENCES

1. Efimova, I.N., 2012. Regional research and innovation cluster as a basis for modernization of the regional system of education, politics, economics and business. *Journal of Higher School Alma Mater*, 6: 15-19.
2. Chuprunov, E.V., S.N. Gurbatov and B.I. Bednyy, 2010. Comprehensive Research University in the Innovative Knowledge Society. *University Management: Practice and Analysis*, 1: 6-16.
3. Grudzinskiy, A.O., 2004. Project-oriented university: professional entrepreneurial organization of the university. N.Novgorod. UNN Press, 3: 7-14.
4. Etzkovitz, H. and L. Leydcsdorff, 2000. The Dynamic of Innovations: from National System and "Mode 2" to a Triple Helix of University-Industry-Government Relations *Research Policy*, 29: 109-129.
5. Clark, B.R., 1998. Creating entrepreneurial universities: organizational pathways of transformation. *Issues in Higher Education*. IAU Press, Pergamon, Elsevier Science, 4: 31-37.
6. Grudzinskiy, A.O. and A.B. Bednyy, 2009. Knowledge transfer - function Innovative University. *Higher Education in Russia*, 9: 18-24.
7. Paradella, F., 2001. What is the Entrepreneurial University? DEAN Third Annual Conference Proceedings, pp: 23-28.
8. Kozminski, A., 2002. The role of higher education reforming society in a globalized world: academical reliability and commitment to improve the level of woo-call. *Higher Education in Europe*, 4: 25-31.
9. Grudzinskiy, A.O. and A.B. Bednyy, 2012. Innovation Infrastructure of University as Laboratory for Training Innovators Knowledge Transfer. The New Core Responsibility of Higher Education Institutions Practice and Perspectives in Russia and Germany, Gabriele Gorska (Ed.). Kassel University press GmbH, 5: 47-60
10. Private Ranking System, 2011. Indicator "Educational Activities of the University" Date Views 10.05.2013 <http://unirating.ru/txt.asp?rbr=34>
11. Private Ranking System 2011: Indicator "Research Activities of the University" Date Views 12.05.2013 <http://unirating.ru/txt.asp?rbr=35>
12. Private Ranking System 201: Criterion "University Brand" Date Views 14.05.2013 <http://unirating.ru/txt.asp?rbr=38>
13. Vladyka, M.V., 2009. The innovative potential of higher education institutions as a factor of competitiveness *Economic Development. Scientific Statement BSU*, 10/1, 7(62): 35-48.