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AS AN EFFECTIVE MECHANISM  
OF REGIONAL INNOVATION SYSTEM DEVELOPMENT****И.В. Скворцова, В.М. Макаров****ИННОВАЦИОННО-ОБРАЗОВАТЕЛЬНЫЙ КЛАСТЕР  
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РАЗВИТИЯ РЕГИОНАЛЬНОЙ ИННОВАЦИОННОЙ СИСТЕМЫ**

The article is devoted to the problem of integration of science, production and education, the formation of a new approach to the development of innovative regional economy with the use of innovative-educational clusters, which will allow universities to become centers of the accumulation and dissemination of ideas, knowledge and technologies which can effectively influence the development of science and society as a whole.

INNOVATION INFRASTRUCTURE. INNOVATIVE-EDUCATIONAL CLUSTER. ORGANIZATIONAL STRUCTURE OF MANAGEMENT. THE PROJECT-ORIENTED UNIVERSITY. INNOVATIONS.

Статья посвящена проблеме интеграции науки, производства и образования, формированию нового подхода по развитию инновационной региональной экономики с применением инновационно-образовательных кластеров, что позволит вузам стать центрами накопления и расширения идей, знаний и технологий, способных эффективно влиять на развитие науки и общества в целом.

ИННОВАЦИОННАЯ ИНФРАСТРУКТУРА. ИННОВАЦИОННО-ОБРАЗОВАТЕЛЬНЫЙ КЛАСТЕР. ОРГАНИЗАЦИОННАЯ СТРУКТУРА УПРАВЛЕНИЯ. ПРОЕКТНО-ОРИЕНТИРОВАННЫЙ УНИВЕРСИТЕТ. ИННОВАЦИИ.

Education and science have an increasingly significant position in the development of modern society and become leading factors of getting competitive advantage of the country in the international arena.

The most important priority of the state innovation policy in Russia is the creation of effective innovation system supporting the development of innovative activities of higher education: improving the quality of specialists' training, developing research and technological base, stimulating universities' innovation activity.

The modern infrastructure of higher school combines fundamental science, retrieval and applied scientific-research activities, educational work as well as the processes of commercialization of the scientific results and the integration of university's educational and scientific potential in innovation within the economic system of the country.

At present, the higher school system of the Russian Federation hosts an innovative infrastructure which includes 163 technoparks; 185 business-incubators; 12 regional training

centers in the field of innovative entrepreneurship; 22 regional information-analytical centers; 46 regional innovation centers; 118 innovative-technological centers; 122 technology transfer centers; 73 centers of collective use of unique scientific equipment and 46 science cities [8, 11]. But according to the Ministry of education and science of Russia, the higher education sector in the Russian Federation is represented by 1,115 higher education institutions. Thus the quantitative indicators of higher school innovation infrastructure mentioned above are not sufficiently high in comparison with the number of higher education institutions.

Most modern universities can be characterized by a low level of legal and economic support in the field of intellectual property, spontaneous nature of innovation activity and the lack of systematic approach to managing it.

Nowadays a serious problem in Russia is an inefficient use of resources in the field of education (the irrational structure of the issue) and science (low demand for knowledge in the market, the initiating character of R&D, a low

level of commercialization of innovations). There is disconnection of education, science, and business. Thus the innovative infrastructure of the higher school does not fully exploit its opportunities, which directly affects the results of innovation development both in the regions and in the whole country.

In recent years, the state has been paying more and more attention to the solution of this problem [3]. In the framework of the «The Strategy of the Development of Science and Innovation in the Russian Federation up to 2015» the Ministry of education and science plans the establishment of technological platforms as a mechanism which would unite representatives of business, science, and government interested in conducting long-term joint scientific-technical activities aimed at the implementation of the following actions:

- intensification of efforts to create prospective commercial technologies and new products (services);
- attraction of additional resources for research and development involving all stakeholders (business, science, state);
- improvement of the legal base in the field of scientific and technological innovation development [1].

One of the possible forms allowing active cooperation between science, business and society is *an innovative-educational cluster (IEC)* on the basis of higher school [3].

Based on the practice of a number of regional universities: Perm National Research Polytechnical University, Stavropol State Agrarian University, Tambov State Technical University, etc., clustering has established itself as an effective mechanism of integration of the results of higher school's innovation activities in the real sector of economy, universities' development as well as their positioning in Russian and international educational area [4].

An innovative-educational cluster is a multilateral treaty or associative union of educational institutions, enterprises of the real economy, scientific organizations with matching long-term aims of joint activities in the field of the development, implementation in manufacturing and commercialization of new technologies and new kinds of competitive products, professional training and improvement of staff skills in the interests of the participants of the cluster, the

creation of joint infrastructure which supports innovation cycle of development and product manufacture, provision of necessary staff.

The objective of the IEC activities is an identification, a formation and an attraction of competitive resources (knowledge, human resources, equipment and technologies, intellectual property), the promotion of informational support for research and development, the creation of favorable conditions for the transformation of its results into competitive advantages of the region and the country [7]. In pursuing these objectives the IEC addresses the following tasks:

1. Generation of innovative ideas and projects implementation in the field of natural sciences, engineering and arts, also interdisciplinary fields.
2. Promoting the creation of small innovation enterprises.
3. Formation of personnel reserve in university.
4. Strengthening international scientific cooperation.
5. Encouraging of requests for research and development from the business community [2, 12].
6. Transformation of knowledge, experience, and technology which universities possess into commercially successful product.
7. Increasing the competitiveness of businesses in the cluster.
8. Increasing the level of education in the region (not only of higher education but also of secondary and secondary vocational education).

The participants of the cluster are educational institutions (colleges, universities, advanced training institutes), commercial organizations (manufacturing and engineering, consulting and venture capital firms), innovative infrastructure of university (scientific-educational centers, technoparks, small innovative enterprises), as well as governmental and municipal authorities (Fig. 1). Business, in this case, is one of the customers of educational and research activities of universities [7].

The core of IEC is often formed by educational institutions which determine the competitiveness of enterprises. First of all, it concerns the development and implementation of new technologies, training and improvement of qualification of the personnel, consulting firms in various fields of activity, joint use of innovative infrastructure (technoparks, business incubators, centers for collective use of equipment, technologies transfer centers, etc.), accumulation and transmission of knowledge between companies in the cluster.

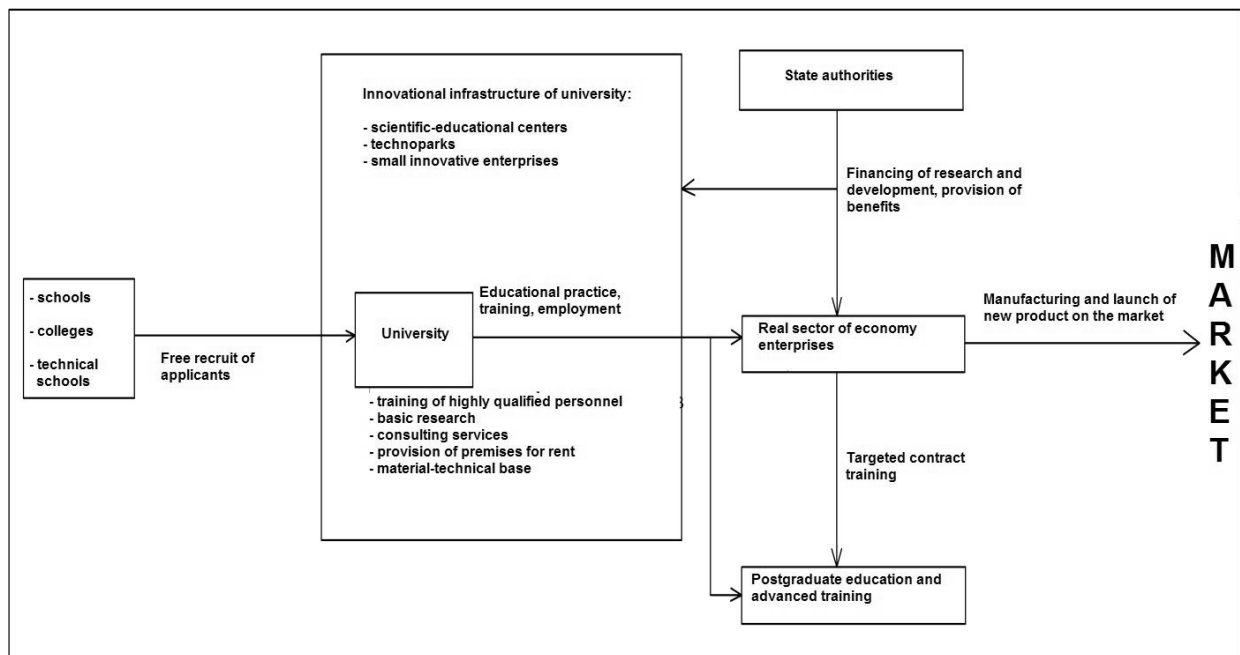


Fig. 1. Regional IEC model

By implementing these functions, educational institutions, in turn, will get access to the funding for research from private firms, will implement commercial educational programs for employees of companies in the cluster, improve educational programs in order to ensure their compliance with the current needs, organize students internship and training at the enterprises of the cluster, attract specialists and experts from the enterprises, participants of the cluster, to the educational process and also improve the qualification of university staff on the basis of the enterprises, participants of the cluster.

It is possible to say that the most effective system is the partnership in IEC of representatives of different levels of professional education, including interaction with the public schools. Schools and colleges are integrated into the system of continuing education and school leavers get access to higher education by signing agreements with universities about the enrollment without entrance examinations taking into account the level of their education [7].

One of the basic elements of the cluster is an innovative infrastructure of the university representing a network of interrelated and complementary elements of innovation activity, where there is a transfer of knowledge, innovational projects and their further

commercialization. University *scientific-educational centers (SEC)* should be focused on the provision of advisory, educational and research services to the enterprises of the cluster. The material base of SEC should satisfy interests of not only universities, but also of private entrepreneurs, small and medium-sized businesses as well as the local authorities.

Technoparks are an important element of the IEC; they include a variety of specific functional areas: offices, research laboratories, industrial, storage and exhibition areas. The infrastructure of technoparks is diversified by nature and may include consulting, staffing, advertising agencies, investment, legal and insurance companies, real estate valuation agencies and audit agencies, etc.

The key factor in the effectiveness of IEC is the maximum convergence of educational and production purposes, the effective use of personnel, and the scientific-technical potential of the region [7]. And also:

- multidisciplinary approach to research and educational activities that is most obvious if polytechnic university becomes the core of the cluster;

- common goals of IEC entities and their compliance federal state and regional interests, which is typical mainly for large industrial centers such as Moscow, St. Petersburg and others;

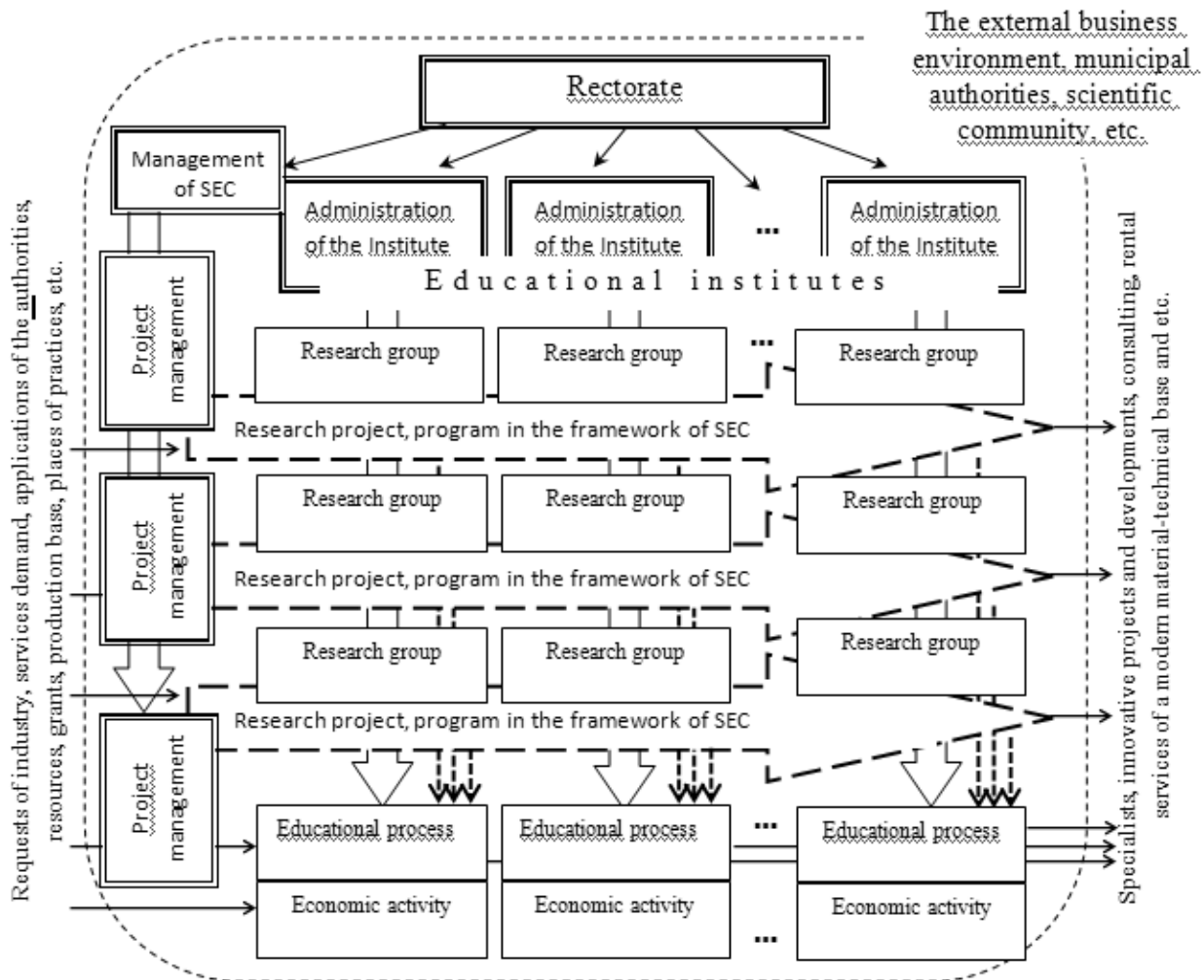


Fig. 2. An example of matrix organizational structure of university management

– territorial localization which allows to build IEC on the base of already existing or developing industrial and financial groups (in Saint-Petersburg, energy and power engineering is an example of the first kind of groups, and automobile manufacturing – of the second);

An effective system of intracluster interaction provides a balance of its participants' interests and the emergence of an «effect of the system» or a synergetic effect [5].

For universities, the synergetic effect reveals itself in:

- increase in a university's rating;
- professional development of the faculty staff and graduates through their participation in the implementation of innovative R&D according to the order from the real economy sector;
- involvement of the most competent employees from the real economy sector in

educational process, implementing joint projects with universities;

- application of the results of advanced R&D in the educational process;
- extension of the access to market information for universities and facilitation of products and services of the SEC promotion to the markets of financial and industrial groups;
- possibility of additional earnings for university faculty staff due to their participation in the scientific-technological development and consulting services;
- exploitation of the possibilities of attracting investments and grants for the SEC.

Almost all universities consider clusters as the most advanced form of strategic partnership with science, business, and authorities of the region. Many of them have experience in the implementation of the cluster approach and



cluster policy. But they lack methodological recommendations concerning the organization of this process. In fact, the process of IEC formation has to change the *organizational structure of management* of the university on the basis of the system approach principles.

The theory of systems states: the change of targets and strategy of organization development (including scientific and educational organizations) should be accompanied by its restructuring. The creation of SEC implies a change in the structure of the executive subsystem of the university. But the appropriate change of management subsystem must correspond with it.

The basis of the formation of new organizational structure of management is an idea of the *project-oriented university*. Its realization requires the decentralization of the university management, which can be achieved, for example, through the transformation of faculties into institutes by transferring part of authority to the operational management. It will increase their autonomy, flexibility in decision-making, responsibility and will activate the «bottom-up initiatives».

In institutes, it is appropriate to establish a system of responsibility centers (departments,

research laboratories, other divisions) which can focus on increasing the income (profit centers) or on the cost savings (cost centers) within the allocated budget. In terms of university's economy, this approach implements a concept of controlling and, in terms of management, it corresponds with the essence of the matrix model of university management (Fig. 2).

In this matrix model, the vertical control actions provided by institutions support educational and economic processes, and horizontal linkages are formed within the scientific-research programs and applied projects by various divisions, integrated into the SEC. The purpose of such complexity of the organizational structure is an improvement of management efficiency and profitability of operations of the IEC parent educational institution, as well as simplifying its integration into the external environment [7].

In the framework of the innovative economy, universities become centers of the accumulation and extended reproduction of ideas, knowledge and technologies, centers of the development of new intellectual technologies capable to influence education and science in the region and in the whole country.

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