The organizational and determinant model of the educational cluster of a Higher Education Institution

El modelo organizativo y determinante del sector educativo de una institución de Educación Superior.

Flura I. Khramtsova [1], Maria A. Erofeeva [2], Aleksandra I. Terekhova [3], Elena M. Andreykovets [4], Natalya N. Voroshilina [5]

1 Doctor of Political Science, Professor of the Department of Management and Social Work, Russian State Social University - RSSU (Minsk branch), Minsk, Belarus

flura.org@gmail.com

2 Doctor of Education, Professor of the Department of Pedagogy, Moscow University of the Ministry of Internal Affairs of Russia named after V.Ya. Kikot, Moscow, Russian Federation

erofeeva-ma72@yandex.ru

3 PhD in Economy, Associate Professor, Head of the Department of Management and Social Work, Russian State Social University - RSSU (Minsk branch), Minsk, Belarus

temp17@yandex.ru

4 Senior Lecturer of the Department of Management and Social Work, Russian State Social University - RSSU (Minsk branch), Minsk, Belarus

emandreikovetc@mail.ru

5 PhD in Education, Associate Professor of the Department of Management and Social Work at RSSU (Minsk branch), Minsk, Belarus

natasha.voroshilina@mail.ru

Fecha de recibido: 2020-02-08
Fecha de aceptado para publicación: 2020-02-28
Fecha de publicación: 2020-04-03

Abstract

Strategies for sustainable economic growth of national states make the problem of training highly qualified personnel important in the cluster infrastructure of a higher education institution. The organizational and determinant model of the educational cluster “high school-higher education institution-science” devised in the course of the study is capable of influencing the level of academic continuity as the main mechanism for the reproduction of scientific personnel to solve modernization problems. In the course of the study the following methods were used: comparative analysis, content analysis, generalization, classification, synthesis, extrapolation, design and modeling. The authors of the paper have developed the concept of academic mobility of students under the conditions of the educational cluster “high school-higher education institution-science”. The methodology of the individual cluster follow-up and support for students has been substantiated scientifically. The results were tested in the research and educational activities of the affiliate of Russian State Social University in the city of Minsk, the Republic of Belarus, in the State Educational Institution “High school No. 1 of Minsk named after Francis Skorina”, the State Educational Institution “Grodno City High School”. The prospects for further research consist in developing the institutional foundations of cluster mechanisms for the union integration of science, higher and secondary education institutions of the Republic of

Belarus and the Russian Federation. Innovative ideas of the clustering policy of higher education institutions in the framework of the Union State require informational support, the use of the resources of the Public Chamber of the Union State, the Russian Center for Science and Culture, and business communities of Belarus and Russia.
Keywords: clustering, sustainable development, innovation and industrial cluster, educational cluster, externalities of spillovers, proto-cluster, organizational and determinant model, institutional environment.

Resumen

Las estrategias para el crecimiento económico sostenible de los estados nacionales hacen que el problema de la capacitación de personal altamente calificado sea importante en la infraestructura del clúster de una institución de educación superior. El modelo organizativo y determinante del grupo educativo "escuela secundaria-institución de educación superior-ciencia" ideado en el curso del estudio es capaz de influir en el nivel de continuidad académica como el mecanismo principal para la reproducción del personal científico para resolver problemas de modernización. En el curso del estudio se utilizaron los siguientes métodos: análisis comparativo, análisis de contenido, generalización, clasificación, síntesis, extrapolación, diseño y modelado. Los autores del artículo han desarrollado el concepto de movilidad académica de los estudiantes en las condiciones del clúster educativo "instituto-educación superior-ciencia-institución". La metodología del seguimiento individual del grupo y el apoyo a los estudiantes se ha comprobado científicamente. Los resultados se probaron en las actividades de investigación y educación de la filial de la Universidad Estatal Social de Rusia en la ciudad de Minsk, República de Bielorrusia, en la Institución Educativa del Estado "Escuela secundaria N º 1 de Minsk llamada así por Francis Skorina", el Estado Institución educativa "Grodno City High School". Las perspectivas para futuras investigaciones consisten en desarrollar las bases institucionales de los mecanismos de agrupación para la integración sindical de la ciencia, las instituciones de educación superior y secundaria de la República de Belarús y la Federación de Rusia. Las ideas innovadoras de la política de agrupamiento de las instituciones de educación superior en el marco del Estado de la Unión requieren apoyo informativo, el uso de los recursos de la Cámara Pública del Estado de la Unión, el Centro Ruso de Ciencia y Cultura y las comunidades empresariales de Bielorrusia y Rusia.

Palabras clave: agrupación, desarrollo sostenible, innovación y conglomerado industrial, conglomerado educativo, externalidades de efectos indirectos, proto-conglomerado, modelo organizativo y determinante, entorno institucional.

Introduction

+

Global changes in the whole world in the context of the globalization pace, competition of economies, knowledge, technology, information naturally transform new goals, content, models of educational systems (Kiseleva et al., 2018). Diversification areas of educational services expand the integration of education and science based on the state cluster policy as strategies for sustainable regional development (Makarova et al., 2019). Cluster policy in a number of countries of the world is used as a tool to increase the competitiveness of national economies, the innovative development of industries, production facilities, business entities, entire regions. Clustering is carried out in breakthrough areas of business and economic activity with the participation of research institutions and leading regional institutions of higher education (Tastan & Davoudi, 2017; Bayanova et al.., 2019). This article presents the results of the research work “Development of a generative model of academic mobility of the student youth and mechanisms for its implementation in the framework of the educational cluster “High school-higher education institution-science” based on the materials of Russian State Social University in the city of Minsk, registration number 20162667, a subprogram “Sociology and Philosophy” of the state program of scientific research “Economy and human development of Belarusian society” (2016-2019). The areas of innovative activity have been outlined in a higher education institution to increase the effects of educational, research and scientific activity in the conditions of the educational cluster. The determinant factor of clustering educational activity as a driving force of the competitiveness of the national economy and the reproduction quality of scientific personnel have been revealed. The organizational and determinant model of the educational cluster of a higher education institution “High school-higher education institution-science” has been substantiated scientifically.

METHODOLOGICAL FRAMEWORK AND METHODS

The development of the theoretical and methodological foundations of the educational cluster in a higher education institution requires a substantive analysis of the leading concept of “cluster” as a multifaceted phenomenon that has actively been used in the United States since the 1980s in the course of strategic analysis and strategic management of industries and companies. The term was introduced into scientific use by M. Porter, an American economist in 1990 in the work “International Competition”, in the framework of the concept of a rhombus of national advantages, best known as the scientific methodology of national and regional competitiveness (Porter, 2005).

The initial methodological premise of the research problem is the analysis of the cluster theory of innovative processes in the field of business and economic activity of M. Porter (Porter, 2005). This theory is also understood as the scientific basis of the system of target modeling and design of the educational cluster of a higher education institution. The solution to research problems requires clarification of the scientific methodology of cluster formations in the field of socio-economic activity, their general structural and functional properties, which are explicated on the laws of educational processes.

So, the “cluster” has been designed as a special regionally structured, relatively independent polysubjective union of economic activity institutionally regulated that represents an innovative type at the level of internal and regional regulatory acts in line with the current national legislation (Demenchuk, 2013; Ishmuradova et al., 2018). The cluster phenomenon, according to M. Porter, is distinguished by a common character of goals and tasks of the subjects of interaction, a common local-geographical location, and a leading professional field specific feature (Porter, 2005). The purpose of cluster education is to develop new forms of social partnership in the framework of various related sectors through rapprochement, deep integration of economic entities in cooperation with the field of the “knowledge industry”: scientific organizations, universities for the joint development of innovative areas in conditions of strong competition (Erofeeva et.al., 2019).

In M. E. Porter’s general theory of the cluster, the following features and signs of cluster formations in the form of structural and functional properties have been substantiated: 1) the presence of the cluster nucleus of the control subject in the field of innovative reproduction of products in joint activities; 2) the circulation of vertically horizontal bonds; 3) the geographical proximity of the location of the subjects; 4) innovative activity of subjects; 5) regulation of the functions, rights, obligations of cluster entities; 6) stable, cooperative relations; 7) information exchange in the creation of cluster products; 8) the manufacturability of the cluster cycle, identical to the innovation process (from goal-setting activities to generating ideas and the full technology for creating and mass replicating the

product). M. E. Porter identifies the following types of clusters:
- associations of regional economic entities (the economic cluster);
- associations of administrations, governments of the interregional level (political clusters);
- research associations of various branches of science (research clusters);
- associations of financial institutions (financial clusters);
- associations of educational institutions of various types and levels (general education, high schools, colleges, institutions of higher education, others), scientific organizations (Porter, 2005).

In general, the cluster as an integrated form is distinguished by its interaction with the "knowledge industry": academic circles, organizations, laboratories, research universities in conditions of heightened competition between knowledge and information. M. Porter, identifies the following types of clusters: economic; political; research; financial; educational ones (Porter, 2005). In view of globalization and competition for resources and markets, new types of clusters are developing, characterized by the scale of transnational integration, new goals, new areas of activity of cluster actors. With this in mind, we will supplement the types of cluster formations: communication, mass media, transnational, etc.

Results and Discussion

A comprehensive analysis undertaken in the framework of the topic shows that there is a variety of interpretations of the meanings of the "cluster" in science. Thus, the interpretations of authoritative theoreticians in line with the general theory of cluster formations like American scientist M. Porter, reflect the functionality aspects of the cluster as an interdisciplinary category: «A cluster is a group of geographically neighboring, interconnected companies, organizations operating in a particular area, characterized by common activities and complementing each other» (Porter, 2005).

The interaction of enterprises and organizations included in the cluster represents as a combination of cooperation and competition. There is a constant exchange of personnel, innovations, technologies, the joint use of infrastructure, services and advertising and marketing promotion. The enterprises and organizations that make up the innovation-industrial cluster are independent business entities, and competition within the cluster is no less important driving force for the development of the cluster as a whole than cooperation itself (Izvekova, 2017). In the course of emerging contradictions and small conflicts, the system as a whole is optimized and increases the opportunities for participation in global competition. At the same time, know-how and various technologies are spreading throughout the chain of the system of interconnections in the cluster. These innovations quickly become a factor in setting up firms, they are changed in relation to the market strategy of specific companies and, in turn, lead to a new round of innovative development. Constant interaction and information exchange within the cluster lead to the adoption of internal systems of restrictions of standards and standard procedures (Reznik & Kurdova, 2017). The dissemination of technologies and standard procedures leads to the development of a system of training specialists and simplifies the movement of personnel between business entities, which, in turn, leads to the further dissemination of knowledge and the growth of qualifications (The concept of the formation and development of innovation and industrial clusters in the Republic of Belarus until 2020, number 27, 2014).

An important feature of the cluster is a factor of the innovation orientation. In this regard, the structure involves the integration of scientific research centers in cooperation with large regional universities. Thus, the clusters provide the movement of new knowledge, advanced technologies into business processes, the rapid growth of profits, and the competitiveness of actors.

In cluster theories, there are different classifications depending on the leading features. The first classification (functionally related) identifies two main categories of clusters, which are formed according to spatial and functional positions: they are less limited by strictly determined regions, usually they are classified as industrial clusters, while spatial groups of similar and related firms and industries belong to regional clusters. The industrial cluster focuses on competition within the sector (Khramtsova & Erofeeva, 2016; Kondrla & Kralik, 2016). It consists of all kinds of actors, resources and activities that are combined to develop production and sale of various types of goods and services (Bunakov et al., 2019). An industrial cluster is not spatially linked to an urban area. It has wider borders, covering the region, country (countries).

The second group of clusters represents the regional cluster itself as a spatial agglomeration of sectoral economic activities that form the infrastructure, the development of which contributes to the formation of externalities as spillovers of new knowledge (Valco, 2018), stimulating new forms, types of restructuring, vocational training and adaptation (Lebedeva, 2017). It is clusters of this type that consist of enterprises, regional universities, specialized educational institutions and academic institutes.

From here the first methodological premise follows that substantiates the educational cluster of a higher education institution on the principles of economic regionalization, considering the socio-cultural, environmental features of the regions, the level of infrastructure, the specific features of the distribution of productive forces.

The second methodological premise is that the central element of the region's economic agglomeration, the potential success of linking the knowledge industry, regional universities, and production is concentrated in the reproductive resources of social, educational capital and geographical proximity. K.Z. Adamova, for example, in the work "Clusters: the concept, conditions of emergence and functioning" emphasizes the importance and sets up a typology of the regional potential of clusters, integrating the research potential of universities, academic institutes, systems of training personnel for new professions (Adamova, 2009). In particular, the features and structure of regional cluster formations have been described. For instance, the specificity of the "Marshallian" clusters of one industry lies in the fact that they use the economy of the production scale of small and medium enterprises and the level of cooperation due to the compact arrangement of entities, the use of shared resources, development of technologies, and professional training of specialists.

Thus, the cluster is a multidimensional interdisciplinary phenomenon of socio-economic, pedagogical science, which designates the combination of goals, interests, resources of entities on the basis of cooperation, mutually beneficial exchange of information, knowledge, through the development of new technologies, training for competitiveness through common use of infrastructure services, legal support, regulation of access to information flows, advertising and marketing promotion of goods. The central element, the synergistic core of a single socio-economic and scientific-educational agglomeration, is considered to be the integration of research resources as a factor in the strategic development of the region and its transformation into the country's capital.

Solving the search problem of modeling the educational cluster of a higher education institution requires studying the experience of clustering institutions of higher education that has developed in different countries of the world. The study proves that the most competitive are the national models of educational clusters located in the USA, Great Britain, France, the Netherlands, the United Arab Emirates, China, the Russian Federation, and other countries of the world.

So, let us look at the sources and competitive advantages of the American model of the higher education institution's educational cluster.

According to the Institute for Strategy and Competitiveness of the Harvard Business School, educational clusters of higher education institutions are located in many US states: California, New York, New Jersey, Massachusetts, and others. For example, the educational cluster of New Jersey unites several universities and colleges based on Princeton University, where both bachelor and master programs are provided. The specific features of the cluster model of Princeton University are inventions, technologies, patents for innovative products. The personnel potential of teachers, researchers, managers is the initial parameter of the educational cluster as high qualification. This type of competitive sphere of the educational labor market is determined by high salaries of researchers, teachers in comparison with the average American salary. The second parameter of the effectiveness of educational clusters are paid methodological, consulting, expert services at the request of consumers, including the development of specialized educational programs, innovative projects, along with academic work. The third parameter of the educational cluster is associated with participation in scientific and applied research, the results of which are quickly introduced in related and supporting industries, geographically located in one regional space, for example, such as financial corporations, pharmaceutical companies, equipment suppliers, information and communication technology developers and publishing production. The fourth parameter in the educational cluster is connected with the creation of a favorable investment climate, a business environment, the resources of which are invested in large amounts in research, along with the target structure of funding from the state government, foundations, business communities. The fifth parameter comprises financial mechanisms to support research activity of students, loans and taxation for students. Cluster interrelations with industry companies, suppliers of goods, materials in one spatial distribution can save costs on logistics, transport, business process innovation, and can contribute to raising labor productivity.

Along with this, the Arab model of clustering in the field of education in the United Arab Emirates (JSC) is of particular scientific interest, with the inclusion of students' potential in the structure of free economic zones for the purpose of retaining qualified university graduates in the strategic areas of the national economy. The national project "Knowledge Village" is implemented with the initiation and support of the Government of Dubai, by attracting 450 companies, the scientific elite of the best academic institutions in the world, and strong funding from the state and business communities. Moreover, Arab countries are

characterized by the creation of clusters from scratch, due to the lack of their own scientific potential and scientific academic schools, in contrast to Western models of educational clusters. In particular, the Dubai cluster project solves the strategic tasks of creating and developing an innovative economy through the following mechanisms: 1) consolidation and influx of young qualified specialists; 2) the search, distribution and redistribution of resources for research activities, as the main factor in strategic development; to continuously train their own scientific personnel; 3) the provision of favorable conditions for doing small and medium-sized business, investment policies, and improving the business environment. Dubai Knowledge Park provides educational programs at various levels and terms of study (from 1 year to 4 years). The structure of the Dubai cluster includes an on-line e-university resource combining multidisciplinary educational institutions, language schools, business training programs, research centers and other forms.

The unique experience of the Chinese model of the educational cluster is of practical interest, the essence of which consists in attracting the research potential of large universities to develop and implement regional strategies for balanced development. Thus, the educational cluster of a higher education institution becomes an actor in world-class territorial production clusters and makes a real contribution to the socio-economic development of the region and the country as a whole. As E.A. Yagafarova, M.V. Puchkov point out "the mega-university of Guangdong province in the city of Guangzhou" is a catalyst of innovative regional development through the implementation of cluster mechanisms for the development and use of the results of research activity" (Yagafarova & Puchkov, 2010). E.A. Yagafarova, M.V. Puchkov identify the advantages of the Chinese model of the educational cluster, which consist in localized regionalization of resources, and precisely in the following characteristics: 1) the territorial proximity of the main urban development facilities - the industrial center of Guangzhou; 2) the potential of Shenzhen as the status of a free economic zone, directly bordering Hong Kong, a financial-administrative, transport and logistics center; 3) a high concentration of the scientific resource of universities, colleges, qualified scientific personnel, and teaching staff; 4) the presence of a unified developed infrastructure (eco-park, shared lake, service facilities, park landscape, logistics of 3 ring roads, industrial enterprises, engineering structures, technology parks, socio-cultural institutions as a qualification sphere for cluster graduates).

The advantages of the Russian model of the educational cluster are original in this discourse which are distinguished by the following signs: 1) the economic expediency of clustering education; threats of a competitive market environment; 2) overcoming regional imbalances by introducing the scientific potential of the cluster into the strategic development of the regions in the Russian Federation; 3) local decompensation of the resources of enterprises that do not have production capacities, significant fuel and energy resources; 4) partnership of agencies in the state and non-state sector in the development of the scientific and educational potential of regional clusters. The experience of educational clusters in the Republic of Tatarstan is illustrative here, based on a network approach, e-learning, vertical-horizontal relationships of domestic and foreign partners, a system of different sources of funding (easy loans, credits, social funds, European grants), the participation of regional governments of the Russian Federation, local authorities, self-government. The activities of the regional educational clusters of Tatarstan are legalized through legal mechanisms, an institutional environment has been created to prevent brain drain abroad, and support scientists and teachers to combine teaching and participation in basic and applied research. For example, the existing problem of training blue-collar workers for enterprises of various forms of ownership is being addressed through the development of a regional concept of vocational education. One of the objectives of this concept is to set up industry-specific educational clusters that combine all levels of vocational education, from the primary to the higher level, with the inclusion of business communities in training and retraining blue-collar workers for the manufacturing sector of the economy.

One should give an illustrative example of a powerful resource of the educational cluster of the Almetyevsk State Petroleum Institute and the Almetyevsk Polytechnic School as subdivisions of OJSC Tatneft. Cluster mechanisms solve the problems of personnel, social, economic, managerial, scientific, educational areas of strategic sustainable development of the region. Along with this, a continuous educational process is provided at higher education institutions, colleges, and lyceums; students are trained (bachelors, masters) and reproduction of qualified personnel in postgraduate and doctoral courses is carried out.

The experience of developing the unique advantages of Plekhanov Russian University of Economics is of scientific and practical interest due to the creation of a multiplicative model of the educational cluster, which is based on five types of complementary and replaceable educational clusters of the network type. In

particular, G.I. Yevlampieva substantiates the network approach as an effective tool for the exchange of information, technology, knowledge among subjects of a general profile (Yevlampieva, 2017). G.I. Yevlampieva emphasizes that the network approach is "a form of unidirectional realization of the economic interests of entities to increase the overall effectiveness of the activities of the network formation and achieve the individual benefits of each actor" (Yevlampieva, 2017). The economic basis of the cluster approach allows one to make a typology of the models of educational clusters implemented at a higher education institution. The integrative model of the educational cluster of a network-type university involves the inclusion of modules of partner organizations in educational programs, requires their procedural coordination, as well as the use of both virtual learning tools and stationary ones in a real time mode. Developing the original approach of G.I. Yevlampieva, we need to note an important methodological aspect, the essence of which is that the proposed models of clusters of educational activities in the conditions of the internalization of national education systems are inherently impossible without an information and technological approach, electronic education (Yevlampieva, 2017). In particular, the individual-network model of the educational cluster implies the possibility for students to independently choose a separate discipline of the variable part of the educational program, the development of which is carried out in partner organizations by concluding an agreement, obtaining an electronic certificate and passing it.

Developing the approach of G.I. Yevlampieva, we introduce a clarifying definition of the specificity of this type of cluster as the property of "cascading of connected stages of activity", the stability of externalities of spillovers in the innovative activity effects of 3 institutions: "a basic organization (higher education institution) - academic institute-enterprise" (Yevlampieva, 2017). The so-called "cascading model of the educational cluster" uses the research potential of academic institutions to effectively implement specialized educational and flexible applied programs by means of project activities, to involve students in solving business production problems by participating in planned tasks, research, and developing innovations based at an academic institute. This makes it possible to form research, design, applied competences of students (Belous & Erofeeva, 2019). The cascading type of a cluster organization of educational activity provides the development of the bases of innovative culture among students (Erofeeva et.al., 2019b). Finally, the network cluster is a dual diploma model, for example, professional training of Plekhanov Russian State University of Economics is carried out through academic exchanges between universities and foreign universities through the conclusion of agreements on international cooperation between universities of various countries. For example, the dual diploma model includes vocational training provided in universities of Germany, France, the Netherlands, Finland and other countries.

Let us consider the existing experience of clustering institutions of higher education in the Republic of Belarus. The creation and development of innovative industrial clusters in the Republic of Belarus is a key priority of the National Strategy for Sustainable Socio-Economic Development. This approach is important for the strategy of restructuring institutions of the higher education system as supporting regional centers for the reproduction of human capital and the structural basis of sustainable regional socio-economic development (The concept of the formation and development of innovation and industrial clusters in the Republic of Belarus until 2020, number 27, 2014). State cluster policy is an inseparable part of a single state socio-economic policy, a set of organizational, legal and economic measures of the state to form and develop clusters as a competitive factor.

Objectives for implementing the cluster policy embrace the following areas:

- the formation of a regulatory framework governing activities in the field of cluster development of the economy through the integration of education and science;
- identifying priority areas for the formation and development of clusters and monitoring the cluster development of the economy;
- the creation of conditions for the professional training of managers and industry specialists on cluster development of the regional economy;
- the creation of specialized training programs for specialists in institutions of higher education, the integration of the scientific and educational base of relevant organizations;
- conditions for the development and implementation of cluster initiatives, projects; state support for the cluster model of economic development as a basis for improving the level and quality of life of people.

The legal bases of the state cluster policy are enshrined in the Concept of the formation and development of innovation and industrial clusters in the Republic of Belarus (approved by the Decree of the Council of Ministers of the Republic of Belarus on January 16, 2014). The following provisions are the leading principles for the implementation of the cluster policy of enterprises and organizations in the Republic of Belarus (The concept of the formation and development of innovation and industrial clusters in the Republic of Belarus until 2020, number 27,

2014):
- multi-level management of clusters as horizontal-vertical relationships of national, regional, interregional and micro-levels;
- economic incentives for the development of clusters of various types, both by indirect methods of state support and indirect subsidizing of individual industries, enterprises, organizations;
- organizational stimulation of clustering, creating conditions for the development of network cooperation (the development of long-term formal and informal relations between cluster entities based on trust, common goals, norms, traditions), the development of public-private partnerships;
- support for promising innovative clusters in the form of providing benefits, privileges, loans, grants.

All required conditions have been created in Belarus. Organizational and practical work has been initiated to form strategically important clusters where regional institutions of higher education are an integral component. However, clustering is at the formation stage, which requires efforts to expand them “in width” (regionally), as well as “in depth” "(inside the “proto-clusters”). At present, organizational and practical work is being carried out to form and develop six regional innovation and industrial clusters, the scientific core of which is made up of the resources of institutions of higher education and research organizations. The most productive innovation and industrial clusters are: 1) the Vitebsk Silicon Valley that offers pharmaceutical, biomedical and information technologies based on Vitebsk State Order of Peoples’ Friendship Medical University; 2) The “green” economy of agrarian biotechnology of the Goretsky district as a subdivision of the Belarusian State Agricultural Academy, LLC “Gorki Technopark”; 3) a petrochemical cluster in Novopolotsk, as a subdivision of Polotsk State University; 4) the Polesie Green Economy cluster in Pinsk, as a subdivision of Polesie State University, the science and technology park of the LLC, Polesie Technopark, the “North-South” transport and logistics cluster (Gdansk, Republic of Poland), OJSC “Pinsk Shipbuilding and Shiprepairing Plant”, biotechnological companies, farms of the Brest region; and other clusters.

However, despite the achievements of the Belarusian system of higher education, the clustering of educational activities at institutions of higher education is underdeveloped. The country lacks comprehensive studies of cluster mechanisms of innovative educational complexes. Business communities, bodies of state power, bodies of local government and self-government do not fully pay attention to the problem of clustering higher education institutions. Separate independent attempts of educational institutions rely more on the initiative, but do not have the legal foundations of clustering, the necessary sources of funding for research activities. Whereas the need for clustering institutions of higher, general secondary, specialized secondary education in conjunction with the subjects of the organizational and technological complex of the regions reflect the need for innovative economic development of the country and the solution to the problem of the scientific personnel shortage.

Higher education institutions are more affected by the determinant factors of globalization and regionalization, market competition and internalization of advanced practices, clustering of the educational environment (Mitin, 2016; Erofeeva et.al., 2018). The following processes serve as determinant factors of the clustering of regional institutions of higher education:
- support and implementation of the Lisbon Strategy provisions by the countries of the European Union as priority of the policy of national states;
- the development of the Bologna process in the international system of higher education as a basis for educational clusters of universities, the expansion of the market for educational services, the resource base of educational, research, scientific activity, funding from the public and private sectors;
- the development of standard, flexible, adaptive and special vocational education programs by institutions of higher education in conjunction with specialized, sectoral national and foreign partners for scientific, research, educational activities, academic exchange, at the expense of budget, one’s own and third-party sources of funding;
- liberalization of migration policies of individual countries regarding students arriving according to academic exchange programs to expand academic educational experience and motivate research activities for the benefit of national interests;
- the use of the English language as a means of international communication, internalization of vocational education practices, clustering of universities, academic exchange, distance learning, electronic means of retraining and advanced training for the economy and social sphere.

The essence of the determinant dependencies of clustering institutions of higher education consists in the need for a balanced state policy of a cluster approach in the field of higher education as a structural basis of the economy, the training of qualified specialists and scientific personnel. The priority of developing educational clusters of higher education institutions in the structure of regional industrial clusters is thought of as a factor of economic security and the functional strategy of the state cluster policy (The concept of the

formation and development of innovation and industrial clusters in the Republic of Belarus until 2020, number 27, 2014).

It is evident that the completion of large-scale tasks of clustering sustainable and uniform national, regional and interregional development is impossible without the reproduction of highly qualified specialists. Setting up territorial-production clusters as interconnected points of social and economic growth needs a creative scientific elite. Clustering institutions of higher education requires new approaches to management, which are based on lowering administrative barriers, weakening the dominance of industry management, strengthening the role of regional-territorial management, under the influence of the development of market relations. Government assistance is needed in the form of subsidizing the costs of the centers of cluster development of higher education institutions, the economy, its industries, partners, cluster infrastructure, the general use of equipment, laboratories, and premises in a single territory. This is possible under the conditions of cooperation in the reproduction of new highly qualified personnel, attraction of targeted foreign investments at the international level in order to develop clusters such as joint ventures, franchising agencies, transnational corporations, owing to the development of public-private partnerships.

As a result of a comprehensive study (2016-2019), an organizational and determinant model of the university's educational cluster was developed as components of a regional innovation and industrial cluster. The essence of this model consists of 5 methodological aspects.

The first aspect. The organizational and determinant model of the educational cluster of a higher education institution is an open scientific and educational system that unites higher education institutions, industry research organizations, and specialized enterprises in a single territorial localization; the proto-nucleus of the cluster is the flagship regional institution of higher education; network interaction resources; state ideology; a corporate mission; the institutional environment, norms, procedures, management; sources of funding; the access to information technology resources of the conglomerate.

The second one. The organizational and determinant model of the educational cluster of a higher education institution is a unique social institution for the continuous generation and synthesis of knowledge of 3 types: 1) science - the source of high technology, the circulation of academic elites, the driving force for the innovative development of society; 2) economy - as an object of market competition, the basis of national security, distribution and redistribution of resources; 3) culture - as the nucleus of the development of intellectual potential, the scientific elite, the subjective academic identity of students.

The third one. The organizational and determinant model of the educational cluster is the predicted result of the state's cluster policy in the medium and long term. The mechanisms to manage the educational cluster of a higher education institution embrace state support, participation of relevant industries, enterprises, organizations, business communities, the development of the institutional environment, and economic events.

The fourth one. The conglomerate actors' value chain is the driving force of the cluster which includes the priorities for society of the values of knowledge, information and innovation technology. The effectiveness of a cluster depends on the support of specialized industries, innovative companies, and international partners. The value chain of cluster education is impossible without a favorable business environment, insurance, banking and financial services, marketing, sales, PR, logistics, and service.

The fifth aspect consists in providing strategic planning, controlling, forecasting, monitoring the labor market, scientific personnel, and training specialists in priority areas; in the integration of resources, cooperation in conducting joint research programs, projects, innovative sites at the regional, interregional, international levels.

Thus, the integration of regional institutions of higher education in the overall structure of innovative industrial clusters with the participation of scientific organizations requires the implementation of the following principles:

the balance of educational, scientific, innovative processes in conjunction with the economic, socio-cultural needs of the country and region;

the economic expediency of training specialists, based on the real needs of the labor market, the real production sector, in partnership with scientific organizations, taking account of priorities of the national and regional sustainable development strategies;

the development of academic mobility of students as a potential opportunity for additional educational experience based on methodological homogeneity and specialization of professional programs of academic exchange between institutions of higher education;

externalities of spillovers of innovation processes within the cluster in the form of new advantages, benefits, exchange of information and knowledge, experience and technologies, multi-level transfer in a transnational and international socio-economic space (Khramtsova, 2017);

the reduction of dependence on state funding by expanding partnerships with organizations of

various forms of ownership; attracting direct foreign and portfolio investments; marketing of educational, scientific and methodological and consulting services;
motivation to provide job placement and retain young qualified personnel in economically free zones, economic integrated agencies by creating conditions for the influx of personnel, university graduates as an alternative to work abroad;
continuous reproduction of the reserve of scientific personnel by means of academic mobility, on the basis of the active inclusion of students and high school students in the research process in the framework of state tasks of research, projects and programs of innovative and industrial clusters.
The results of research work "Development of a generative model of academic mobility of student youth and mechanisms for its implementation in the framework of the educational cluster "high school-higher education institution-science" based on the materials of the affiliate of Russian State Social University in Minsk have a practical orientation which are used in the following areas:
the development of "Scientific and practical recommendations on the formation of the educational cluster of a higher education institution" and participation in the III All-Russian contest of scientific and creative works "Socialization, upbringing, education of children and youth" (the author - F.I. Khramtsova, 2017), was awarded with the Diploma of the First degree (order No. 21, dated June 27, 2018, Kirov, the Russian Federation);
consulting on the implementation of the republican innovation project "Implementation of the model of the republican methodological cluster as a resource for the development of additional education for children and youth" of the Ministry of Education of the Republic of Belarus (at the request of the State Educational Institution "National Center for the Arts of Children and Youth", 2018, 2019);
management of the innovative project "Educational Cluster of the Union State" (the person in charge - F.I. Khramtsova, Deputy Chairman of the Education Commission of the Union State Public Chamber, expert hearings, Moscow-Minsk, 2018-2019);
preparation, participation in the Forum of Prospective Socio-Economic Development of the Union State (Moscow, 30.03.2018.). A plenary report "On the state of ideological and educational work on the formation of social immunity of student youth in the Republic of Belarus" (Khramtsova & Erofeeva, 2016);
preparation of practical recommendations based on the results of the conference of the Parliamentary Assembly of the Union of Belarus and Russia "Important problems of the construction and development of the Union State" (July 5-6, 2018). A poster report "The educational cluster of the Union State: experience, innovation, problems".

Conclusions

The principles of integrating high-tech industries and resources of leading universities, scientific organizations, business communities through state regulation of the cluster approach as a factor of sustainable regional development, the structural basis of the economy and training of scientific personnel have scientifically been developed on the basis of the undertaken analysis of the theory and practice of international, national cluster policy implemented in the Republic of Belarus, the empirical base of research activity of the affiliate of Russian State Social University in Minsk of the Republic of Belarus.
Based on a comparative assessment of scientific, methodological, and empirical data on cluster processes of integrating science, higher and secondary education, and business entities, the methodological bases of the organizational-determinant model of the educational cluster of a higher education institution have been scientifically determined, the essence of which can be represented in the following ideas (the structure of the theoretical model is presented in Figure 1):

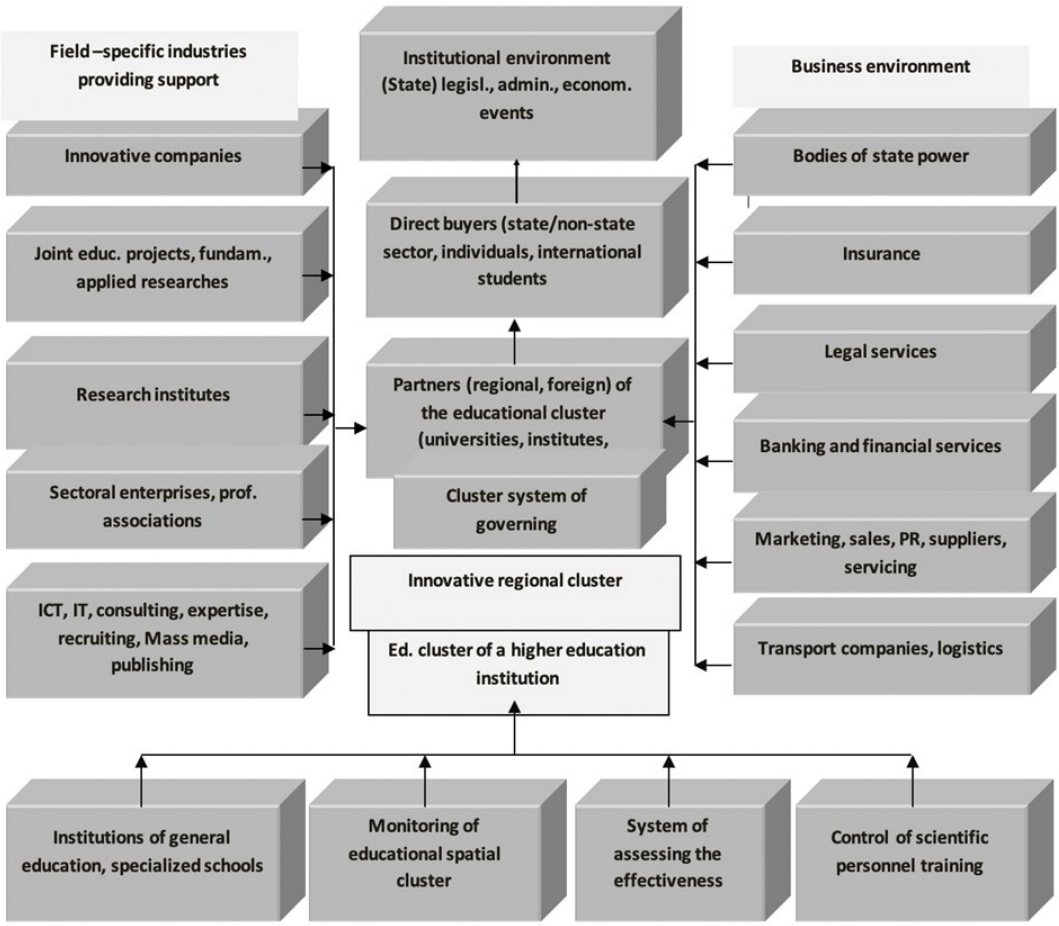

Fig. 1. Organizational and determinant model of the educational cluster of a higher education institution

the improvement of the institutional environment, the outline of the educational cluster of a higher education institution, including legal regulation of joint activities of entities, cluster management systems (the cluster nucleus) in the framework of adopting cooperation programs in the innovative development of science institutions, higher and general secondary education and regional socio-economic systems as points of innovation growth;

providing a comprehensive approach in equipping the eco-technological infrastructure of the educational cluster of a higher education institution that combines resource, information, consulting, financial centers; scientific laboratories, platforms of scientific structures; a cultural and recreational complex; an eco-park; bodies of governing and monitoring the quality of cluster products;

functionality of the subjects in the regional-local dimension, in view of the conditions for the development of academic continuity and social mobility of students at different stages of the educational system through individual cluster support programs: from studying in a high school to studying at a university, from studying at a university to postgraduate study, getting scientific qualifications, subsequent work in a research organization;

the integration of educational and scientific processes in order to generate new knowledge, develop innovative educational technologies and teaching methods as a means of creating unique competencies of students in conditions of a cluster profile of future professional activity;

the transformation of a number of traditional functions in the instruction of a higher education institution into multiplicative ones through the flexible combination of the roles (a lecturer-adviser, a scientist-researcher, a methodologist-practitioner, a coordinator-executive);

a systematic approach to the research, design, organizational and managerial activities of teachers to create cluster scientific and methodological products based on the resources of the base enterprise, with the participation of students, with the underlying

principle of the priority of a higher education institution's innovation policy;
comprehensive introduction of research results into practice of the educational process, modification of the research component of individual routes of students' educational activity (preparation of term papers, diploma, creative works) through participation in innovative projects, scientific production and research practices at scientific institutions, in scientific and educational publications, events, consultations at the request of third parties.

References

Adamova, K.Z. (2009). Cluster policy as a tool to increase the competitiveness of the national economy. Bulletin of the Saratov State Technical University, 38, 172-177.

Bayanova, A.R., Vodenko, K.V., Sizova, Z.M., Chistyakov, A.A., Prokopyev, A.I., Vasbieva, D.G. (2019). A Philosophical view of organizational culture policy in contemporary universities. European Journal of Science and Theology, 15(3), 121-131.

Belous, E.N. & Erofeeva, M.A. (2019.) Features of professional communicative competence of teachers in subject communication with students. Prospects for Science and Education, 4(40),126-140.

Bunakov, O.A., Aslanova, D.K., Zaitseva, N.A., Larionova, A.A., Chudnovskiy, A.D., Eidelman, B.M. (2019). Religious and halal tourism organization peculiarities in Muslim republics. European Journal of Science and Theology, 15(3), 85-96.

Demenchuk, P.Y. (2013). Educational cluster as an institutional system for the integration of education. Education Integration, 4, 27-30.

Erofeeva, M.A., Stolyarova, A.N., Evseeva, I.G., Popova, T.A., Lobzhanidze, A.A., Luchenkova, M.A., Kalinin, I.V. (2019b). The Development of a Safe Educational Environment at a Higher Education Institution within the Framework of the Ecopsychological Approach. Ekoloji, 28(107), 5089-5093

Erofeeva, M.A., Stolyarova, A.N., Ilyicheva, I.M., Kodzhaspirova, G.M., Kodzhaspirov, A.Yu., Pogodina, O.A. & Gorohova, I.V. (2018). Moral and demographic determinant of the formation of Youth Social Immunity in the sphere of higher Education. Modern Journal of Language Teaching Methods (MJLTM), 8(10), 185–197.

Erofeeva, M.A., Ulyanova, I.V., Plakhotnikova, I.V., Kurilyuk, Y.E., Egorov, V.A., Kochetkov, I.G. (2019a). Reforming and developing socialization of children with limited abilities (mild intellectual disability). Electronic Journal of General Medicine, 16(2), em112.

Ishmuradova, I.I., Grebennikov, V.V., Krokhina, J.A., Pavlenko, E.M., Makarova, E.V., Solovyeva, N.A. (2018). Social and philosophic foundations of youth nonconformity in contemporary Russia. European Journal of Science and Theology, 14(6), 143-158.

Izvekova, O.O. (2017). Educational complex of the Volgograd region: problems and development paths. Prospects for Science and Education, 3(27), 26-30.

Khramtsova, F.I. (2017). Cluster approach in the formation of academic mobility of student youth in the Republic of Belarus. Minsk: Bestprint.

Khramtsova, F.I.& Erofeeva M.A. (2016). Social immunity of the youth of Russia and Belarus as an object of the policy of the Union State. Kolomna: State Social and Humanitarian University.

Kiseleva, N.I., Dorozhkin, E.M., Kislov, A.G., Ryazanova, E.L., Galushkin, A.A., Koinova-Zoellner, J. (2018). Philosophical analysis of information and communication environment. European Journal of Science and Theology, 14(6), 115-124.

Kondrla, P. & Kralik, R. (2016). Authentic being and moral conscience. European Journal of Science and Theology, 12(4), 155-164.

Lebedeva, M.M. (2017) International political processes of education integration. Education Integration, 21(3),385–394.

Makarova, E.V., Kryukova, N.I., Sizova, Z.M., Grinenko, A.V., Erofeeva, M.A., Bukalerova, L.A. (2019). Divergence of supreme values of Russian world and western civilization social and philosophical analysis. European Journal of Science and Theology, 15(3), 97-107.

Mitin, S.N. (2016). Psychotherapeutic approach in the management of the development of educational systems. Simbirsk Scientific Journal Vestnik, 4(26), 31-39.

Porter, M.E. (2005). Competition: Per. from English. Moscow: Williams Publishing House.

Reznik, G.A. & Kurdova, M.A. (2017). Functions of a Russian University in the Formation of an Innovation-Oriented Economy. Education Integration, 21(3), 441–458.

The concept of the formation and development of innovation and industrial clusters in the Republic of Belarus until 2020 (approved by resolution of the Council of Ministers of the Republic of Belarus dated 01.16.2014, No. 27).

Tastan, S.B., & Davoudi, S.M.M. (2017). The Relationship between Organisational Climate and Organizational Innovativeness: Testing the Moderating Effect of Individual Values of Power and

Achievement. International Journal of Business Innovation and Research, Inderscience Publishers, 12(4): 465-483.

Valco, M. (2018). Global and Local Challenges of the interaction of natural and human sciences. European Journal of Science and Theology, 14(5), 1-3.

Yagafarova, E.A.& Puchkov, M.V. (2010). Innovation Cluster – Mega University in Guangzhou. Academic Bulletin Ural-research project RAAN, 3, 21-24.

Yevlampieva, G.I. (2017). Network learning models and principles for creating educational clusters. Bulletin REU them. G.V. Plekhanova, 3, 28-34.