

## Formation of Education Clusters as a Way to Improve Education

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### ABSTRACT

The purpose of this research is to analyze basic prerequisites formation and development factors of educational clusters of the world's leading nations for studying the possibility of cluster policy introduction and creating educational clusters in the Republic of Kazakhstan. The authors of this study concluded that educational cluster could be regarded as a relatively new phenomenon, therefore it was little studied. Nonetheless, it has already been widely used, and, due to its diversity, is characterized by high potential. The application of cluster approach towards the organization of innovative activity leads to the enhancement of economic entities in the country (or certain region), focuses on innovation and the brand new level of technology, as well as production management in every area of economic activity. Educational clusters are aimed at integrating branch-wise correlated institutions of vocational education into the industry players. The creation and functioning of educational clusters directly influences the improving competitiveness of educational institutions, as well as promotes integration between the educational administration, financial, research and educational institutions and businesses. Practical significance: further analysis of premises and successful growth of educational clusters, which are most competitive in the global educational area, the analysis of the deliberate cluster policy implementation in order to increase the efficiency of educational clusters around the world, and the formation of key success factor list, based on it. This list will become fundamental for the creation of educational clusters in the Republic of Kazakhstan, and improvement the competitiveness of the educational system.

### KEYWORDS

Cluster, regional cluster, higher education, Republic of Kazakhstan, New Jersey, Ontario, Dubai

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### Introduction

Modern economy has global character and is oriented on the world market (Fedorov & Alekseeva, 2011). Experience of developed nations has shown that the innovative development of education demands the creation of new tools, which will provide the dynamic development of higher education system (Min, Ling & Pew, 2015).

Amid new requirements to the results of education specialists training, the problem of educational structures rearrangement, technologies modernization and professional training development steps forward (Morrison, 2016). For the majority of countries nowadays the problem of national and regional

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competitiveness increase becomes topical, and is solved mostly with the help of cluster approach as one of the most efficient tools of innovative development, which promotes the creation of detailed coordination between the state, business, science and education (Li & Wang, 2016). One of the most developed forms of science, education and real sector of economy integration are innovative clusters, aimed at securing favourable environment for the intellectual and technological capacity of major industrial companies, research and development centres and universities (Gentry, 1996).

In the last two decades the cluster formation process is actively under way (Perrotta & Williamson, 2016). Generally, according to the experts' estimates, nowadays about 50% of developed economies are involved in clustering. The activization of cluster approach growth in foreign countries proves its efficiency and serves as the basis of the efficient interaction between business sector members, the state, trade associations, research and educational institutions within the innovative process (Hrabowski, 2014).

## Literature Review

### *Educational cluster: definition analysis, system performance features*

Nowadays there are several definitions to the notion of "an educational cluster". For example: cluster as an educational institutions association, connected together by "raw materials" supply, experience and educational standards exchange (Lapygin & Koretskiy, 2007).

The classical definition of cluster was defined by M. Porter (2008): "Educational cluster is a group of geographically neighbouring interconnected companies and organizations connected to them, working in a certain area and characterized by common activities and mutual reinforcement". "Educational cluster" is a complex of educational institutions of all educational levels within certain geographical area, resource and employer suppliers, innovative system elements, as well as administration and government bodies, whose activity is connected with nearby industries and the development of regional innovative system" (Manuylova, 2007). "Educational cluster" is a complex of educational institutions of all educational levels, industries of correspondent government bodies, whose activity is connected with industries and is aimed at successful innovative development" (Galimova, 2009). "Educational cluster" is a complex of interconnected institutions of vocational education, connected branch-wise and by partnership with the industry players (Zhuravlyova & Bashkirtseva, 2008).

Lately, educational clusters research becomes increasingly topical (Khamidullina, Timiryasova & Gafiullina, 2009). Modern scientists characterize educational clusters as a new-type interaction system of social dialogue and social partnership (Koretskiy & Lapygin, 2006). The important distinctive features of branch educational clusters are (Smirnov, 2010):

- 1) Creating conditions for training specialists with different levels of vocational education;
- 2) The integration of education with science and industry;
- 3) Prestige enhancement of highly qualified vocations.

Cluster can be understood as a special system, in which adding elements only improves its functioning, and removing them does not result in irreparable harm (Anistsyna, 2010). Cluster systems possess enough productivity, stability and can

be easily augmented or modernized (Timiryasova et al., 2015). The key benefits of cluster systems are the globality, openness, flexibility and relative simplicity of control (Reid, Stibbe & Lowery, 2016).

The clusters are oriented at multitask application. The integration of various, sometimes even no-purpose structures, into clusters does not just come down to simple addition. The whole is not equal to the sum of its parts anymore, it is not bigger or smaller than the sum of parts, it is just different (Houghton, 2009). The new principle of cluster parts coordination into the whole appears – the setting of an overall development rate of cluster parts. "The understanding of general principles of organization of the evolutionary whole is essential for the elaboration of proper approaches towards the development of the complex social and geopolitical whole" (Krivykh & Makarenaya, 2003).

An educational cluster is a group of educational institutions within certain territory, that as a final product form an educational service, competitive and interacting providers of necessary factors of industry, equipment, specialized services, utilities, research and development centres, which reinforce each other's advantages (figure 1). As well as the majority of competitive clusters, educational clusters occur naturally due to the existence and interaction of a significant amount of factors (Mukhametzyanova & Pugacheva, 2010).

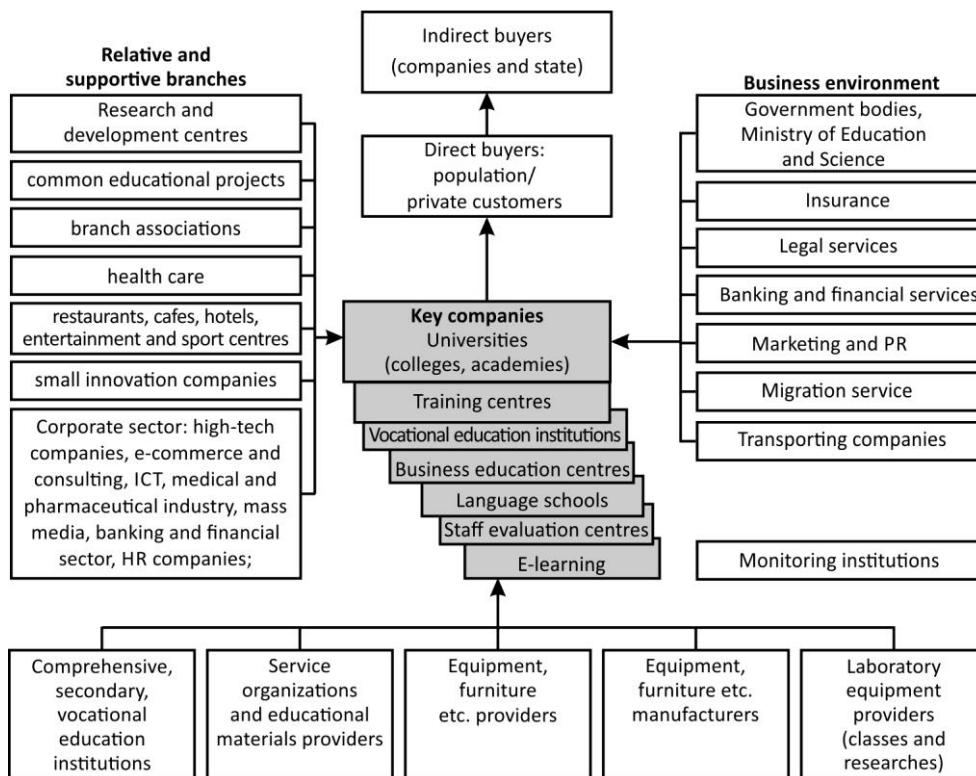


Figure 1. Educational cluster scheme

### *Educational clusters: experience of global market leaders*

The most competitive educational clusters in the world are those centred within different American states (Kleiner, Kachalov & Nagrudnaya, 2008).

According to the Institute for Strategy and Competitiveness of Harvard Business School, which implements the cluster-mapping project within the United States, the leading educational clusters are located in such American states, as California, New York, Massachusetts, Pennsylvania, New Jersey etc. (Shamova, 2006).

According to the researches of European Cluster Observatory, on the territory of EU countries, there are 69 functioning clusters, having various levels of innovative development, export turnover, pay rate etc. (Ignatov & Trushnikov, 2010). The most developed educational clusters are located in such European cities, as Oxford, Warsaw, Amsterdam, London, Paris etc. (European Cluster Observatory Database).

According to the Institute For Competitiveness and Welfare in Canada, the leading Canadian educational clusters are located in Ontario and Quebec (Bobrov, Zhukova & Yarovova, 2007).

At the same time, in the last years educational clusters appear and develop more and more actively within certain developing economies (UAE, Singapore, China, Jordan), whose welfare and economy competitiveness grow much faster (Amsale, Bekele & Tafesse, 2016).

### ***Aim of the Study***

The aim of this research is to analyze the basic premises, formation and development factors of educational clusters of the leading nations for enquiring the possibility of introducing cluster policy and creating educational clusters in the Republic of Kazakhstan.

### ***Research questions***

The overarching research question of this study was as follows:

Do educational clusters promote the improvement of educational services quality and university competitiveness? Which positive changes can be achieved as a result of educational cluster activity?

### ***Method***

The research was conducted through such research methods: monographic, economics and statistics analysis, calculative and constructive, expert analysis, abstract-logical.

### ***Analysis and Results***

Seems that the most overarching and convenient evaluation of factors of successful cluster occurrence and development, comparative analysis of their competitiveness advantages, and, accordingly, determining the ways of improving their efficiency, is the "diamond" model, introduced in five research papers of Harvard Business School professor M. Porter (Pyatinkin & Bykova, 2008). For the better understanding of the possibilities of using this pattern in the assessment of the development level, potential and disadvantages of educational clusters within Kazakh regions, it seems appropriate to apply comparative analysis of international experience in the formation and development of educational clusters in New Jersey (USA), the cluster functioning in the Canadian province of Ontario (Canada), as well as a cluster developing in Dubai (UAE).

This choice is predetermined by the leading position of the first two clusters in the global educational space, as well as the specific features of their development,

the choice of Dubai is due to the fact that the prerequisites for economic development of the territory are close to the conditions of the Republic of Kazakhstan.

The education cluster in New Jersey dates back to 1746, when by the decree of King George II "to teach youth languages, arts and sciences", Princeton University was established. Currently, the key educational institutes of the cluster are Mercer County Community College, Middlesex County Community College, New Jersey Medical and Dental University, Princeton University, Rider University, Rutgers University, the College of New Jersey, Thomas A. Edison Community College. They are located on the territory of such districts, as Mercer and Middlesex. The education cluster includes 73600 students of full-time study in undergraduate programs, and 14,300 students enrolled in the master's programs. The key cluster universities account for 56 patents in the United States annually. The research patent indicator for \$ 1 million equals 0.10 (U.S. Cluster Mapping Project).

Education Cluster in Ontario is located in the south-west of the province and covers the territory of regions such as Kitchener, Waterloo, Guelph, Hamilton, London. The occurrence of this cluster dates back to 1847, when the Ontario government acquired 500 acres for the creation of the Ontario Agricultural School. Currently, as a part of the cluster, there are about 110,000 full-time study students enrolled in undergraduate programs and 11,400 students enrolled in the master's programs. The key universities of this cluster account for 12 US patents per year. The research patent indicator for \$ 1 million equals 0.04. The key educational institutions of the cluster include Conestoga College, Fanshawe College, McMaster University, Mohawk College, Wilfrid Laurier University, Waterloo University, University of Guelph, University of Western Ontario (Canadian Cluster Data, 2016).

The Knowledge Village in Dubai as the basis for the educational cluster appeared in 2002 as a part of the Government of Dubai initiative for the development of "knowledge society", according to which it was planned to create several clusters operating on the principle of free economic zones. The formation of the Knowledge Village in Dubai through attracting international academic institutions, was aimed at creating the conditions to "hold" the youth, which previously preferred to study abroad, in the region. In addition, the presence of the Knowledge Village guaranteed a steady flow of skilled graduates. Finally, it was designed as an incubator for research and development in order to create conditions for the development of entrepreneurship (Dubai Academic City, 2016).

Today, there are 31 educational institutions offering multidisciplinary programs ranging in length from one to four years in the International Academic City. More than 12500 students study there, but it is expected that this number will increase up to 40000 students in 2017 (Al Karam, 2004). The cluster contains more than 450 companies, including professional training centers, language centers and research institutes. It also includes the "pioneers" in the field of e-learning as well as online training (Dubai Knowledge Village, 2016).

In accordance with the chosen the "diamond" model analysis, all the factors contributing to the development of clusters were narrowed down to four groups (Kudriavtseva, 2009):

1. Factor conditions.

The first factor (group of factors) is what economists call factors of production (Volov, 2000). While conducting factor analysis, conclusions should not be made only based on the existence of the factor and its volume. It should be clear how effectively it is used and what technologies are involved.

#### 2. Demand conditions.

The second factor that has a significant impact on the development of competitive clusters and which is often not taken into account by those involved in the implementation of public policy – is the need for domestic demand (Mirolyubova, 2004).

#### 3. Related and supporting industries.

The possibility to benefit from high demand can be made difficult by the lack of the necessary related supporting industries (companies) (Maracha, 2009).

There are several reasons for the importance of the availability of local suppliers and related industries (Matveykin, Butler & Minko, 2007):

- Lower production costs: savings in transport costs, logistics;
- The exchange of information, ideas, which leads to the enhanced innovations and increased productivity.

#### 4. The company's strategy, its structure and its competitors.

One of the obvious empirical research findings of M. Porter (2008) was the relationship between a strong competition in the domestic market and the creation and maintenance of high competitiveness in the industry. The large number of competitors in the domestic market itself is not a sufficient condition to ensure success. If between them there is no keen struggle based on unique strategies, the benefits of such competition are reduced to nothing. Moreover, the nation must have other benefits in the "diamond", otherwise the success is unlikely (Cortright, 2006).

Speaking of the influence of various factors, it should be emphasized, that the "diamond" is a system whose components interact, complement and reinforce each other. Each determinant influences the rest (Korchagina, 2009a). Competitive advantage based on only one or two possible determinants is possible in sectors with a strong dependence on natural resources, or in sectors where complicated technologies and skills are poorly applied. To gain and keep a competitive advantage in such industries as education, one needs benefits in all the components of the "diamond".

This is the picture made during the analysis of the competitive advantages educational clusters New Jersey, Ontario and Dubai. Without going into a detailed analysis in this article, it should be noted that one advantage of the educational cluster of New Jersey is its location close to New York City and Philadelphia. Ontario Education Cluster also has this advantage because is located near Toronto. It should also highlight the geographical location of Dubai in the heart of the Middle East in the presence of well-developed means of communication.

Highly professional staff (teachers and researchers) act as the main factor of development (training) of competitive programs and attraction of funding for research. Colleges and universities use the teaching staff as the main factor of production. Still, all the clusters have a wide choice of materials and services suppliers working within the cluster.



For the key companies of the discussed educational clusters, as the related and supporting industries can be distinguished companies in the field of high technology, e-business and consulting, ICT, medicine and pharmaceuticals, media, banking and financial sector, companies in the field of human resource management – most of them are well represented in the regions of analyzed clusters. In addition, for the development of educational clusters the connection between the existing educational institutions and the corporate world is extremely important, as it leads to the maximization of the knowledge production in the society, rapid access to information, innovation, etc.

At the same time the higher competitiveness of the clusters can be interfered by some problems.

In particular, despite considerable interest from students in joint programs, the schools in New Jersey have not been able yet to develop and implement such programs. In addition, the complex immigration laws make the process of recruitment of foreign teachers difficult for cluster schools in New Jersey and Ontario, and the government regulations and control of tuition fees establishment restricts the freedom of action for the universities. Finally, a large proportion of students in New Jersey study in universities outside the state (58%), due to higher prices for education in the state (Timiryasova et al., 2009). Cluster schools need to find ways to attract local students (Zalyalova, 2010).

Summarizing the analysis of the basic conditions for the educational cluster development in Dubai, some conclusions could be made:

1) At the beginning of the education cluster project in Dubai, the level of "diamond" model development was low;

2) The most developed factors at that time were factor conditions and domestic demand; moreover, a positive dynamics of both determinants can be noted – the demand quality improvement and the "developed specialized factors" extension, which form a more substantial and lasting basis for competitive advantage than the common factors;

3) The absence of academic institutions at the initial stage of a cluster formation, therefore, the absence of competition;

4) The positive and significant role of government in the "diamond" model formation and creation of conditions for cluster development (Kamli, 2004).

The solution to these and many other problems can be found through the cluster-based approach implementation (Yuriev, Chvanova & Peredkov, 2009).

Within this approach, the following points could take place:

1. Joint programs as an efficient mechanism of knowledge spillover into related spheres;

2. The spread of joint programs among universities in order to join resources;

3. Reducing dependence on public funding through enhanced partnerships with manufacturing corporations;

4. Joint projects of foreign commercialization (Park, Yu & Jo 2016).

In conclusion, it is necessary to note some differences between the presented model of the cluster formation in a developing country and the western models. The essence of the latter is that in most western countries, regardless of what structures are engaged in the cluster policy implementation – a business or a state – this policy mostly focuses on the development of already existing clusters. The



approach used in Dubai and several other Middle Eastern countries demonstrates the "cluster creation from the ground up" (Korchagina & Sokolova, 2010). In this case, we are not talking about the formation of new key and related companies within the cluster by the government. The government does not create businesses and does not force private businessmen to engage in a particular business that seems "right" to the public authorities (Korchagina, 2009b). It provides the most favorable conditions for those who are already competitive in the world and may be interested in expanding their activities. The state "completes" the "diamond" model, i.e. directs its efforts to improve conditions within the individual elements of the "diamond" (Shlenova, 2009). In addition, the State forms a reservoir of skilled labor and scientific personnel, who can then create their own educational institutions (Javorsky, 2008).

### Discussion and Conclusions

The educational cluster is a relatively new phenomenon. However, it has already occupied a strong position and, because of its diversity, has a high potential (Tereshin & Volodin, 2010). There is no doubt that in modern world the education clusters have a high degree of risk and uncertainty in some operation results (Asadullin, 2009). Nonetheless, overcoming these barriers, new integration structures will contribute to the improving of education quality and university competitiveness on the educational services market through the development of fundamental and applied scientific, economic and social growth (Karamursov, 2009).

Positive changes resulting from the activity of the educational cluster are:

1. The creation of conditions for ensuring access to qualified primary, secondary and higher vocational education for young people;
2. Development and implementation of programs for the continuous multi-level education that combines research institutions and institutions of secondary and higher vocational education, providing the possibility to adapt the educational programs to the changing labor market conditions and the real economy needs;
3. Accumulation, preservation and augmentation of moral, cultural and scientific society values;
4. Activities based on the real needs of the region for highly qualified personnel, as well as the market needs formation, taking into account the prospects of the country and region development;
5. Cost optimization in the educational process of scientific-industrial orientation.
6. Training of highly qualified specialists who are competitive on the labor market, competent, responsible, fluent in their profession, oriented in the related areas and ready for the constant professional growth, social and professional mobility.
7. Creation of personnel reserve forming system at the levels of pre-university, university and post-graduate training; specialists selection available from the point of view of learning and further work in organizations.
8. Providing the innovative science development and system integration of education, science and production, including the scientific research integration with educational process through the innovative educational programs implementation.



9. Formation of specialist's maintenance system during their adaptation to industrial and social environment.

### Implications and Recommendations

The implications and recommendations for the education cluster implementation are the following:

- The cluster approach use leads to the increased concentration of economic entities in the country (region), contributes to the innovative orientation of production, facilitates the achievement of a qualitatively new technology level and production management in all economic activity spheres. Education cluster is intended to unite the efforts of interrelated professional education institutions with the industry in the united area.
- The establishment and operation of educational clusters has a direct impact on improving the educational institutions competitiveness and promotes integration between education authorities, financial, research, educational institutions and industries.
- Further identification of the prerequisites and conditions for educational clusters successful development, the program analysis for the implementation of a cluster policy to improve the educational clusters efficiency in different countries and formation of the important success factors is going to become a basis to create educational clusters in the Republic of Kazakhstan, which will significantly increase the competitiveness of its educational system.

### Disclosure statement

There was no potential interest conflict reported by the authors.

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### References

- Al Karam, A. (2004). Knowledge Village: Establishing a global destination for education in Dubai. Retrieved from <http://www.britishcouncil.org/goingglobal-session-2-1225-thursday-tne-abdulla-alkaram-paper.pdf>.
- Amsale, F., Bekele, M., & Tafesse, M. (2016). The Ethical Behaviors Of Educational Leaders In Ethiopian Public Universities: The Case Of The Western Cluster Universities. *European Scientific Journal*, 12(13), 23-31.
- Anistsyna, N. (2010). Innovative Research and Education cluster as a way of organizing innovation activities in high school. *Creative Economy*, 4(40), 91-97.
- Asadullin, R. (2009). Integration as a new form of pairing of education, science and practice in the region. *Accreditation in education*, 32, 16-18.



- Bobrov, S. A., Zhukova, N., & Yarovova, V. (2007). Actual issues of clusters as a tool for improving the competitiveness of the region. *Fundamental Research*, 12, 508-509.
- Canadian Cluster Data. Retrieved on May 2016, from <http://www.competeprosper.ca>
- Cortright, J. (2006). Making sense of clusters: regional competitiveness and economic development. Retrieved from [http://www.brookings.edu/metro/pubs/20060313\\_Clusters.pdf](http://www.brookings.edu/metro/pubs/20060313_Clusters.pdf)
- Dubai Academic City (2016). Official website about DIAC. Retrieved on April 2016, from <http://www.diacedu.ae/page.php/about-diac>.
- Dubai Knowledge Village (2016) About DKP. Retrieved from <http://www.kv.ae>
- European Cluster Observatory Database. (2016). About ECOD. Retrieved on May 2016 from [www.clusterobservatory.eu](http://www.clusterobservatory.eu)
- Fedorov, L., & Alekseeva, Z. (2011). Integration as ensuring the integrity of the system of vocational education and dynamic In *GEO Syberia-2011 VII International science congress*, digest. June 4-7. Novosibirsk: SSGA
- Galimova, L. (2009). Education Cluster as a mechanism of innovative development of industrial activity. *Bulletin of Kazan technological university*, 5, 125-127.
- Gentry, M. (1996). *Cluster grouping: An investigation of student achievement, identification and classroom practices*. Unpublished doctoral dissertation, University of Connecticut, Storrs.
- Houghton, R. (2009). *Education cluster capacity mapping: Global study*. Retrieved on February 2009, from <http://educationcluster.net/?get=000377%7C2013/12/Education-Cluster-Capacity-Mapping-Global-Study-Feb-2009.pdf>
- Hrabowski, F. (2014). Institutional Change in Higher Education: Innovation and Collaboration. *Peabody Journal of Education*, 89(3), 291-304.
- Ignatov, A. V., & Trushnikov, D. (2010). Regional clustering of educational systems as the actual problem of the sociology of education. Paper presented at the *International Conference about Actual problems of sociology of youth, culture and education*. February 3. Yekaterinburg: Ural State Technical University.
- Javorsky, O. (2008). Educational cluster as a form of social partnership of technical school and the gas sphere enterprises. Kazan: KSU.
- Kamli, A. (2004). Dubai Knowledge Economy 2003-2008. Retrieved from <http://ae.zawya.com/researchreports/madar/DKE-I.pdf>
- Karamursov, B. (2009). Continuing professional education at university complex. *Higher education in Russia*, 5, 27-41.
- Khamidullina, G., Timiryasova, A., & Gafiullina L. (2009). Areas of reform of higher vocational education. Kazan: Poznanie.
- Kleiner, D., Katchalov, R., & Nagrudnaya, N. (2008). Synthesis of a cluster strategy based on system-integration theory. *The science. Innovation. Education*, 7, 9-39.
- Korchagina, N. A. (2009a). Cluster policy – the technology of efficiency increase of companies' management: monography. Astrakhan: Publishing house "Astrakhan University".
- Korchagina, N. A. (2009b). Educational clusters as the basis of educational institutions competitiveness improvement. Astrakhan: "Astrakhan University" publishing house.
- Korchagina, N., & Sokolova, K. (2010, April 12-13). Cluster policy implementation efficiency evaluation as a way of modernizing the education system: Dubai experience. *The priorities and interests of modern society: materials of International Research-to-Practice Conference*. Astrakhan: "Astrakhan University" publishing house.
- Koretskiy, G., & Lapygin, D. (2006). Prerequisites of integration into the educational cluster. *Vladimir State University: electronic journal*, 4. Retrieved from <http://journal.vlsu.ru/index.php?id=58>
- Krivykh, S., & Makarenya, A. (2003). Educational anthropoecology. Pedagogy of life. St. Petersburg: GNU IOV RAO.
- Kudriavtseva, O. (2009). The dominance of clusters in the economy. *Actual problems of humanitarian and natural sciences*, 11, 149-151.
- Lapygin, D., & Korensky, G. (2007). The outlines of a regional education cluster. *The region's economy*, 18, 25-29.

- Li, W., Wang, Y. (2016). Research on the Performance Evaluation Model of Higher Education Teachers Based on the Improved Grey Clustering Analysis Method. *International Journal of Emerging Technologies in Learning*, 10(8), 123-134.
- Manuylova, E. A. (2007). The innovative development of the region: the formation of regional educational clusters. *Innovation*, 7(105), 75-79.
- Maracha, V. (2009). Formation of clusters as a mechanism of self-organization and territorial partnership for the implementation of innovative strategies for improving competitiveness. In *Conference proceedings of the Tenth Anniversary of the International Forum "High Technologies of XXI Century"*. April 21-24. Moscow: NPKF "Mavra" CJSC.
- Matveykin, V., Dvoretzky, S., & Minko, L. (2007). Innovation potential: current state and prospects of development. Moscow: Mashinostroenie-1.
- Min, W., Ling, K., & Piew, T. (2015). The Effects of Technological Innovation, Organizational Innovation and Absorptive Capacity on Product Innovation: A Structural Equation Modeling Approach. *Asian Social Science*, 12(1).
- Miroljubova, T. (2004). The cluster borders identification as a starting point of realization of government economy regulation system on the regional level. *Economy*, 2, 141-146.
- Morrison, C. (2016). Purpose, Practice and Theory: Teacher Educators' Beliefs about Professional Experience. *Australian Journal of Teacher Education*, 41(3), 105-125.
- Mukhametzhanova, G., & Pugacheva, N. (2007). The cluster approach to the management of vocational education. Kazan: PPI PO RAO.
- Park, Y., Yu, J., & Jo, I. (2016). Clustering blended learning courses by online behavior data: A case study in a Korean higher education institute. *The Internet and Higher Education*, 29, 1-11.
- Perrotta, C., & Williamson, B. (2016): The social life of Learning Analytics: cluster analysis and the 'performance' of algorithmic education. *Learning, Media and Technology*, 7, 33-43.
- Porter, M. (2008). *Clusters and Competition: New Agendas for Companies, Government, and Institutions*. Boston: Harvard Business School Press.
- Pyatinkin, S., & Bykova, T. (2008). Cluster development: the essence, current approaches, foreign experience. Minsk: Tesey.
- Reid, S., Stibbe, D., & Lowery, C. (2010). Final report (Final Draft). *Review of the global education cluster co-arrangement*, 4, 55-67.
- Shamova, T. (2006). The cluster approach to the development of educational systems. Proceedings of the X International Educational Forum *Interaction of educational institutions and the institutions of society to ensure the efficiency, accessibility and quality of education in the region*. October 24-26. Belgorod: Publishing house of BSU.
- Shlenova, M. (2009). *Managing use of the creative potential of the youth in scientific and innovative sphere*. Unpublished Dissertation. Moscow: MSU.
- Smirnov, A. (2010). Educational clusters and innovational training in high school. Kazan: RIP "Shkola".
- Tereshin, E., & Volodin, V. (2010). The modern definition of the concept of "cluster" and approaches to the formalization of this phenomenon. *Economics*, 2(63), 164-167.
- Timiryasova, A. Vorontsov, L., Hikmatov, R., & Baygildeev, A. (2009). Formation of development strategy klasternyh systems of the region. Kazan: Cognition.
- Timiryasova, A., Safiullin, L., Kramin, T., Grigoriev, R. (2015). Forming a Model of Cost Management in the Regional Scientific-Educational Cluster. *Mediterranean Journal of Social Sciences*, 6(1), 96-100.
- U.S. Cluster Mapping Project. (2016) In "U.S. Cluster Mapping-Industry Table Chart. 2014". Retrieved on May 2016, from URL: <http://www.isc.hbs.edu>
- Volov, V. (2000). Fractal-cluster theory of educational management structures. Kazan: Publishing House of Kazan State Univ.
- Yuriev, V., Chvanova, M., & Peredkov, V. (2007). University as the centre of innovative educational cluster. *Bulletin TSU*, 5(49), 7-12.
- Zalyalova, A. (2010). *The regional model of teaching staff training in the conditions of an educational cluster*. Unpublished Dissertation.. Kazan: KSU.
- Zhuravlyova, M., & Bashkirtseva, N. (2008). Conceptual and methodological basis for the creation of regional model of continuing professional education in the educational cluster of



petrochemical and oil refining complex. *Bulletin of Kazan. technology University*, 6, 315-320.