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CONCEPTUAL FRAMEWORK FOR INNOVATION CLUSTERS FORMATION AND FUNCTIONING

The article provides a structure arrangement of an innovation cluster and the key objectives of its formation and functioning. The process and conditions of innovation clusters formation and effective performance in Ukraine have been analyzed.

Keywords: innovations; innovation policy; cluster model of economic development; innovation cluster; competitiveness.

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КОНЦЕПТУАЛЬНІ ЗАСАДИ ФОРМУВАННЯ ТА ФУНКЦІОНУВАННЯ ІННОВАЦІЙНИХ КЛАСТЕРІВ

У статті запропоновано структуру інноваційного кластера, наведено основні завдання формування та функціонування інноваційного кластера, досліджено процес і визначено умови формування та ефективного функціонування інноваційних кластерів в Україні.

Ключові слова: інновації; інноваційна політика; кластерна модель розвитку економіки; інноваційний кластер; конкурентоспроможність.

Рис. 1. Табл. 1. Літ. 11.

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КОНЦЕПТУАЛЬНЫЕ ОСНОВЫ ФОРМИРОВАНИЯ И ФУНКЦИОНИРОВАНИЯ ИННОВАЦИОННЫХ КЛАСТЕРОВ

В статье предложена структура инновационного кластера, представлены основные задачи формирования и функционирования инновационного кластера, исследован процесс и определены условия формирования и эффективного функционирования инновационных кластеров в Украине.

Ключевые слова: инновации; инновационная политика; кластерная модель развития экономики; инновационный кластер; конкурентоспособность.

Introduction. A distinctive feature of modern economic development is formation of innovation economy based on generation, diffusion, and deployment of knowledge. So far, in Ukraine there is a necessity of conversion to innovation ways of development for the purpose of strengthening competitive positions in a new technological mode.

Innovations are the factor that can significantly affect the formation of national competitiveness. A major condition for the full use of innovations for national development is a targeted innovation policy. According to the Law of Ukraine "About innovation activity" (2002), an aim of the state innovation policy is the development of socioeconomic, organizational and legal conditions for effective renewal, development and use of scientific and technical potential of the country, introduction of new ecological, safe, energy-saving and alternative technologies, production and realization of new kinds of competitive products.

In the National innovation systems development concept (2009) the need for the formation and maintenance of the national innovation system development, as a way of an alternative consistent state policy, which is aimed at activation of innovation processes, manufacturing development ensurance and national economy renewal is identified.

As provided by the Law of Ukraine "About the priority directions of innovation activity in Ukraine" (2011), the measures regarding the development of innovation infrastructure (innovation centers, technological parks, science parks, technology towns, innovation business-incubators, technology transfer centers, innovation clusters, venture capital funds etc.) are established to realize the priority directions of innovation policy by state.

The process of transition to innovation economy is accompanied by a number of obstacles that hinder its development starting from a significant lag of technological level of Ukrainian enterprises and ending with management failure to fundamentally reorganize the approach to business arrangement.

Thereby, the innovation development of economy provides the introduction of innovations into production and technological processes as well as into the processes of management, organization and education. Clusters are one of the new forms of organization enhancing scientific developments and manufacture consolidation. An important task of cluster policy is ensuring the conditions for new technologies introduction and industry re-equipment.

However, today in Ukraine there is no single approach to creation and development of clusters that determine the urgency for establishing the framework for innovation clusters formation in the national economy.

Latest research and publications analysis. Theoretical and practical issues regarding the application of cluster approach, effectiveness of clusters utilization and their formation as one of the factors of state economic competitiveness increase are considered in the papers of domestic and foreign scientists, such as: M. Bushueva (2012), Y. Mindlin (2011), L. Levkovska (2009), M. Porter (1993), I. Razuvaev (2007), D. Ryhalin and A. Budarov (2006), R. Khasanov (2009) etc.

Unresolved issues. However, the process of formation and functioning of innovation clusters in Ukraine has not attained proper investigation. It necessitates the specification of arrangements regarding the activation of innovation renewal of national economy by creating clusters.

The aim of the research is determination of structure and objectives of innovation cluster and preparation of proposals related to the development of national economy on the basis of innovation clusters.

Key research findings. Innovation development increases the competitiveness of the national economy. One of the perspective directions of innovation development is cluster formation. According to M. Porter's classical definition (1993), cluster is a group of geographically adjacent correlated companies (providers, manufacturers etc.) and associated with them organizations (educational institutions, bodies of state administration, infrastructure companies) that operate in a particular sphere and are complementary.

Economical prerequisites of interconnections of enterprises, organizations, and institutions are similar businesses, interest in creation of common production, infor-

mation, and marketing infrastructure, and also the necessity in coordination of cooperation for the realization of large and complex joint projects.

The priority cluster objectives are: increase of competitiveness of companies and organizations that are the cluster's parts; formation and development of the system of intracluster relations, which allows to use participants' synergy to gain persistent competitive advantages; ensuring organizational and methodological support in gaining the state contribution to joint cluster projects; attraction of financial resources.

According to the world practice, the most effective organizational form of achievement of high level of competitiveness is an innovation cluster (Mindlin, 2011).

Innovation cluster is a comprehensive whole of enterprises and organizations that produce a finished innovation product, which includes the entire innovation chain (from development of fundamental scientific idea to production and distribution of a finished product) (Levkovska, 2009).

Innovation cluster is an integration of different organizations (industrial companies, institutes of higher education, research-and-development centers and laboratories, bank and non-bank credit companies, "business angels", investment and innovation companies, bodies of state administration, public organizations etc.) that allows to use the advantages of intercompany hierarchy and market mechanism, which allows to disseminate new knowledge, scientific discoveries and inventions more quickly and efficiently. A structure of innovation cluster is shown in Figure 1.

Interaction in innovation cluster is carried out by vertical (purchases and sales chains) and horizontal connections (additional products and services, use of similar specialized processes, technologies or institutes). It is the interactions in innovation cluster, the participants of which can effectively use internal resources and mobilize external assets, where the competitiveness of the whole innovation cluster depends on this ability of participants (Razuvaev, 2007).

The main tasks of formation and functioning of innovation cluster are:

1) cooperation within the scope of cluster of enterprises owners of innovation technologies regardless of ownership forms and the size of enterprises interested in extension of the range of consumers;

2) creation of a technological chain of finished product manufacturing in the cluster on the basis of the best world innovation technologies, formation of a single technological platform;

3) rendering the complex technological services to commodity producers according to diversified spheres;

4) execution of effective interaction between enterprises in the cluster and consumers of cluster services;

5) formation of conditions for permanent improvement of existing technologies, and expansion of cluster technological capabilities;

6) strategic development of technological capabilities of cluster enterprises, participants etc.

According to the system approach, innovation cluster is a group of business entities from different interdependent sectors, united into single organizational structure, elements of which are interconnected and function together to ensure the development of self-potential and competitiveness (Ryhalin and Budarov, 2006). The most

significant feature of any socio-economic system and innovation cluster particularly, is an emergence of a synergy effect.

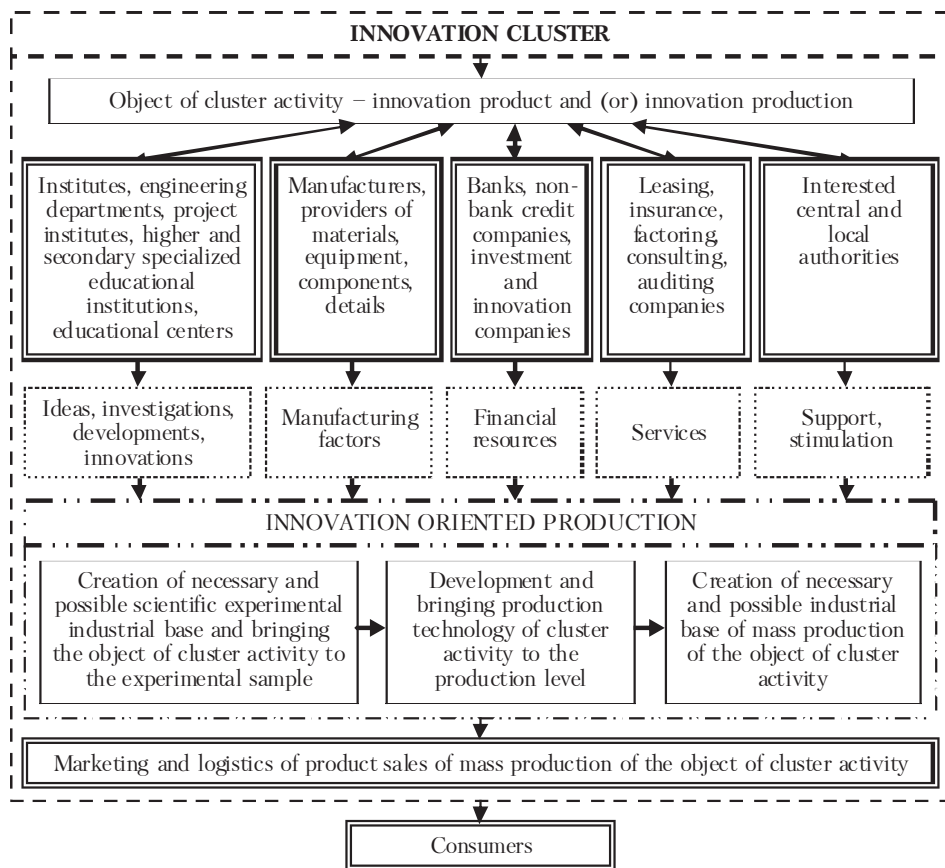


Figure 1. Structure of innovation cluster, created by the author

Synergy effect appears through the separate synergies (more simple forms of synergy effect) as a result of combination of resources and efforts of its participants that act synchronously in the direction of maximization of aggregate profit; the main forms of synergy effect expression is synergy of knowledge flow, synergy of monetary flows, synergy of transaction costs, synergy of infrastructure utilization (Khasanov, 2009).

Clusters is a very favorable environment for the development of synergy effect, since synergy usually appears in the systems with a sufficient degree of integration of separate elements. The basis of synergy in similar cases is an optimum combination of system elements, effectiveness of their interaction, and their quality (Bushueva, 2012).

The effectiveness of innovation clusters formation and functioning determines the urgent need for their implementation into the economy of Ukraine. In the Resolution of the Presidium of the National Academy of Sciences of Ukraine "About formation and functioning of innovation clusters in Ukraine" (2009) it is mentioned that innovation clusters are types of innovation system that can be formed and func-

tion at both levels, where the upper level is national innovation clusters (type A), and the lower one is production innovation clusters (type B).

Innovation structure is a juridical person of any business entity, created according to legislation (type A), or a group of juridical persons that act on the basis of agreement on collaboration without creating a business entity and without joining the investments participants (type B), with defined sphere of activity and type of functioning, oriented towards the creation and adoption of knowledge-based competitive production.

There are conditions for establishing the innovation clusters industry in Ukraine's economy, but their imbalance slows down the process of their creation. The main feature of modern Ukrainian economy is high intellectual potential, large number of institutes of higher education, research institutes, research laboratories, and the availability of a highly-qualified personnel. However, there is no financial interest in Ukraine in the creation of innovation clusters both on the part of the government, and producers, enterprises, private business that can be explained by the absence of reliable argumentation methods of socioeconomical effectiveness of clusters creation and continuance of commercialization. Insufficient activity of research institutions in developing the main directions of clusters evolution, restricted access to the financial resources for enhancing innovation technologies, weak industrial management, regulation, and control also hinder the process of innovation cluster implementation. Moreover, preferential taxation, budget subsidy, credit activities, customs protection, regulatory and legal regulation, patent license protection for such large objects as clusters, are not provided. There are no results of marketing researches that would be available for all parties and show a general picture of Ukrainian markets. There is no extensible access to official information, and there are no programs aimed at socially useful consolidation of businessmen and development of cooperative relations.

Based on the analysis of the world experience of innovation clusters formation, the necessary conditions are determined, and arrangements for establishment of principles of innovation clusters development in Ukrainian economy are proposed (Table 1).

Table 1. Conditions and arrangements for establishing the principles of innovation clusters development in Ukrainian economy, created by the author

Condition	Arrangements
I. State support of clusters formation and functioning, development of clusters' programs, concepts	1. Increase of financial interest by the central and local authorities and <u>proper management of innovation cluster industry creation.</u>
	2. Introduction of preferential taxation and crediting: a) full or partial exemption from the taxable base of part of corporate income that in the future would be used for technological and innovation cluster development; b) transfer of the part of clusters income to the special account for the production development in the future; c) partial or full tax relief of clusters both to the state budget, and to the local budgets to avoid the production decrease, preserve the current and create new working places.
	3. Budget subsidy to fulfill perspective developments and production of <u>innovation high-technology products.</u>
	4. Conduction of effective depreciation allowance reserve policy (accelerated capital allowance) and <u>improvement of the system of pricing</u>
	5. Legislative protection of domestic enterprises that are cluster parts, and provision of protectionist support to products promotion.

Continuation of Table 1

Condition	Arrangements
	6. Favorable patent license activity.
	7. Restructuring of financial system and bringing the bank credit interest rate to the acceptable level for long-term investments.
	8. Increase enterprises possibilities, including small enterprises, to raise investments and grants.
	9. Government financing of some cluster projects by tender arrangement.
II. Factoral terms	1. Ensuring the production factors: «industrial premises», «equipment», «floating assets», «personnel» etc.
	2. Training of highly-qualified personnel, their studying, re-qualification and attraction of young specialists.
	3. Interest stimulation of local industry.
	4. Ensuring favorable export-import balance in the region.
III. Presence of scientific and educational institutions	Ensuring technical education, innovation orientation, «breakthrough» promotion and increase of innovation potential.
IV. Presence of adjacent and service innovation cluster of industries	Development, together with foreign partners, of specialized centers of competences and outsourcing, aimed at transfer of methodology and “technological culture” of production in those spheres of territories specialization, where there is a huge breakdown from the world tendencies at the level of used approaches and technologies (transfer of particular tasks, business-functions or business-processes that are usually not a part of the main operation of company, but at the same time so necessary for full business functioning to the outside organization).
V. Strategy and structure of industry innovation cluster and its organizations	1. Diversification of developments and change of enterprises’ production specialization in the cluster.
	2. Ensuring the collective access to the up-to-date laboratory equipment to finish research and developmental works, and also working-off of innovations under experimental conditions and under the output of industrial consignment of production.
	3. Coordination of requirements of the major plants, which conduct an assembly, to their suppliers and dealers.
	4. Decrease of costs on adoption of new technologies at the expense of scale effect.
	5. Displaying initiative of partner selection, i.e., data bases creation.
VI. Conditions of domestic demand	1. Risks insurance.
	2. Complex monitoring of intellectual potential of territories, assistance in case of new companies from the structures of institutes of higher education, industry research institutes as main sources of innovations on the basis of purpose-oriented start-up financing.
	3. Development of potential market of engineering and consulting services, including small businesses, by introducing subcontracting when executing complex projects and programs (when one industrial enterprise (contractor) places an order with other enterprise (subcontractor) on the development or production of particular production or executing technological processes according to the client requirements, it allows the company-contractor to establish more efficient and effective organizational structure of production).
	4. Extension of the access to information about market needs, promotion of products and services.
	5. Formation of the more effective system of access to foreign partners and new markets entry.
	6. Constant monitoring of statistical data from all enterprises of the region (small, medium and large) in the dynamics with an extraction of development dynamics of separate segments of small business.
	7. Systematic analysis of production indices of economic activity of enterprises, separate segments, industries, and clusters in the region.
	8. Formation of enterprising climate and conditions for competition: «single window mode», «investment conditions», «elimination of administrative barriers».

On the basis of the above, there is a need to develop a single concept of formation and functioning of innovation clusters to coordinate the actions of all participants in case of innovation projects.

Conclusions. Innovation cluster allows to use the advantages of both methods of economic system coordination, that is intercompany hierarchy and market mechanism that permit to disseminate knowledge, scientific discoveries and inventions more quickly and effectively; and concentrate on the business processes, which provide the most value added, transferring the rest to outsourcing, effectively attract and use investments.

Innovation cluster will be successful and effective, if there is a synergy effect in case of interaction of all components. Furthermore, the innovation cluster should grow and develop constantly, herewith it should create innovation products and (or) innovation production. The formation of innovation clusters gives a powerful pulse of innovation development both for small business, and for large enterprises. Since clusters assist innovation orientation of production and reach a totally new level of the quality of technology, organization and management of production in all spheres of economic activity, they play the role of areas of domestic market growth and the basis of external economic development for the whole national economy.

So, in Ukraine clusters should become attractors of the national economy competitiveness increase and strengthening of Ukraine's positions at the world market.

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