

## **Innovative Activities in Enterprises from the Standpoint of Cluster Initiative**

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*Abstract: The principal aim of this study is to present the findings of investigations with theoretical and empirical context concerning the concept of cluster initiative oriented at innovative activities. Increasing complexity of innovations often forces business entities to compete in this area. Entities which are not substantially involved in relationships with business surroundings have poorer opportunities for using necessary competencies and resources necessary for running innovative activities. Building competitive advantage often necessitates supplementation of competencies with knowledge, skills or complementary resources that other market participants have. One of the opportunities for maintaining competitiveness is to implement activities of cluster initiative that allow for development of interactions between business and research initiatives. Consequently, the activities are focused on the common goal: faster and more effective creation and implementation of innovations. The empirical part of the study presents the results of the investigations concerning cooperation of enterprises in terms of innovative activities carried out within a cluster initiative.*

*Keywords: clusters, innovations, networks, cooperation in clusters*

### **Introduction**

Tendencies to improve competitiveness are a characteristic feature of not only business entities but also the whole regions and areas. One of methods to build competitive position and competitive advantage in the regional context is creation of business clusters. They represent a manifestation of a variety and potential of a specific region. The essence of this concept relates to the activities of cooperative character i.e. those that connect competitive relations that occur between entities with relations concerning cooperation and collaboration. Cluster initiative might lead to constant and sustainable development that combines economic, social and environmental goals.

One should emphasize the increasing role of innovative activities in building competitiveness of organizations. The increasing importance of innovative enterprises in activities of contemporary business entities is being observed today.

The literature in this field points to integration of the effectiveness of enterprise activities with their modernity and innovativeness. The ability of an organization to learn and use scientific solutions represents one of the basic factors in establishing competitive advantage. It has been emphasized in the literature that the freedom of enterprise's activity in the area of creation and implementation of novelty might significantly determine its competitive position in the market. [1] Hamel and Prahalad stressed that achievement of economic performance is possible not only through adjustment to changes in enterprise's surroundings but it also results from the active attitude of the organization that manifests itself in taking concrete actions to form the environment. [2]

Market conditions the enterprises have to operate in cause that technological advances have become one of priority factors that form the economic activity and one of the most important challenges the contemporary enterprises must face. With innovative activities, both the organization and its closer and further surroundings are constantly transformed. Maintaining the competitiveness often forces enterprises to show flexibility of the operations and adapt to changes that occur (also technological). The opportunities of the organization concerning initiation of innovative activities are also essential. High complexity of innovations causes that individual entities do not always have sufficient opportunities and resources in order to create innovative solutions. Maintaining competitiveness forces enterprises to supplement skills and knowledge with competencies and complementary principles which other entities (competitors or suppliers) have.

It should be emphasized that building competitiveness often requires that the entities have to supplement and improve their competencies and resources, often as a result of cooperation with other market participants. One of the methods to build competitiveness is to combine entities within activities concerning cluster initiatives. Building clusters of entities in the particular area that show varied character of activities and includes enterprises, universities or self-government entities contributed to transfer of knowledge and information and helps promote innovative activities. Therefore, it should be emphasized that common activities of enterprises, organizations, research teams, various institutions and business entities concentrated in the form of clusters represents a response to the need for building competitiveness not only in the unit area but also in the regional context. Common activities of many organizations, focused on the uniform goal, offer opportunities for quick and effective creation of innovations and application of these innovations in the economic circle, which might be connected with creating of potential in the value chain.

## **1 Aspects of cooperation of enterprises in innovative activities**

In the context of innovative activities, contemporary enterprises are substantially dependent on the flow and abilities to use information from market environment.

This is noticeable during acquisition, development and improving beneficial relationships with other entities that operate in the same surroundings. One example of these activities is regional innovation systems. They are regarded as essential concepts concerning integration of activities in the area of the economy and science and showing such factors as: branch specificity of entities that operate in the specific area, level of business development in this area, resources of knowledge and information and entrepreneurial activity demonstrated by local societies [3].

Creation of such systems is possible through activities of enterprises, universities, research and development institutions, organizations that deal with knowledge and innovations, institutions that support innovative initiatives and local government entities [4]. These entities can cooperate at various levels. One of them are innovative activities, both in the context of creation and implementation. This helps develop various networks of relationships that are based, on the one hand, on cooperation of parties and their consolidation e.g. the method to transfer of knowledge and information and on their competitive activities. Consequently, opportunities open up in the area for promotion and development of innovation of organizational, personal, financial, market-related or political character.

Cooperation in complex innovative projects with regional character requires active cooperation and relationship with other entities and institutions within the network. These mutual interactions between entities that operate in a specific area are presented in the literature by means of *triple helix* model that describes and organizes the relationships and feedbacks between the main representatives in innovation activities. [5] Main parties in this model include institutions in the science sector, enterprises (industrial and service providers) and different institutions that represent the state. The direct effect on specific innovation activities is from such entities as banks, scientific and professional associations, consulting agencies, marketing agencies, stock exchanges, fairs etc. A diversity of the mutual interrelations that occur among the entities should also be emphasized. It is also emphasized that the potential of cooperation is determined by the relationships between the three main entities, and lack of these relationships substantially obstructs the flow of knowledge [6]. Therefore, the views of Carayannis, Barth and Campbell that point to connecting the concept of *triple helix* with the concept of knowledge-based economy should be adopted. [7]

In the *triple helix* model, the relationships that occur in the process of creation and exchange of information about innovative activities are considered between the main entities [8]. Three forms of this model should be presented for this model: internal transformation in specific entities, two-sided effect of entities and development of new network systems that result from mutual effect between all the nodes. Therefore, three levels of mutual effects between the main entities used in this model are observed.

The first level stresses the importance of internal effects that occur in individual entities. The activities carried out within internal reconstruction, are aimed at development of constructive strategies, resources or stimuli to support innovative processes. This helps change and modifies the roles and tasks for individual entities

e.g. alliances are formed to ensure transfer and circulation of information and knowledge and orientation of universities at increasing their openness towards cooperation with the economy.

Bilateral interactions between individual entities, i.e. between the government and science, science and industry or between industry and the government create a triangle of relationships that are formed from various assumptions adjusted to individual entities. It should be emphasized that this affects industrial policy and science and that the activities are oriented at actions of enterprises that affect flow of knowledge, technology or information. Relationships occurring between organizations that represent the state and scientific centres or research and development centres concern in particular formation of priorities for scientific and innovative policy. Mutual interactions observed in relations between the government and industry consist in development of industrial policies and setting right objectives for economic growth in the country or region. Furthermore, the effect of science and industry should extend the area of activities that contribute transfer of technological advances from theory towards practice.

Cooperation of the three main entities in the triple helix model is important in implementation of sustainable policies of innovativeness in the state or a specific region. The scope of commitment and degree of relations between these entities depends on the organizational level at which the cooperation occurs. At the regional level, it might adopt a form of clusters that are aimed at creation and implementation of new solutions that contribute to facilitation and modernization of the economy. Therefore, it can be indicated that sustainable development of regions can be achieved through creation of specific business conditions and through involvement of scientific entities that facilitate deepening and extending knowledge.

It is emphasized that development of clusters is a multi-stage activity. Etzkowitz (2002) distinguished between three basic stages in development of the interorganizational area that transforms into relations with network character. [8] The first stage of development is creation of the area of knowledge, which is aimed at supporting regional innovative environments, comprehensive cooperation towards improvement of local conditions for development of innovative activities and promotion of research activities. Another stage relates to creation of a specific space for building the strategy for regional development during cooperation of the governmental sector, scientific sector and industrial zone and improvement in quality of social capital. Furthermore, the final stage in development of the network is to create innovative space. With this understanding of the reality, the tasks from the previous stages are performed, similar to creation of the capital for common (public and private) initiatives.

## 2 Clusters as subjects of innovative activities

Focus on clusters viewed as entities that have an effect on innovative activities points to adoption of a regional viewpoint for investigations. Nowadays, the importance of cooperation within bigger regional initiatives that have innovative character is increasing. The justification for this standpoint is conscious creation, acquisition and implementation of innovations accepted by a wide range of entities that operate in the specific geographical area.

Clusters area characterized by a form of organization with network character, but not every network of enterprises can be considered as cluster. The business network is essentially a wider concept, which involves such forms as strategic alliances, virtual organizations, joint venture, integrated supply chains, holdings or clusters. Organization of the network must be based on mutual relationships of the parties that form a specific structure, whereas the essence of these relationships is interdependence.

In general terms, the Thorelli's interpretation can be adopted. This interpretation defined the concept of the network as a system of two or more organizations which are willing to participate in a long-term cooperation. [9] Similar characterization was presented by the group of members connected with a set of relations that have a nature of friendship, counselling, inclination and business cooperation. [10] It is also emphasized in the literature that a network means a group of entities or enterprises with a relatively stabilized character. The essence of relationships that occur between these entities is mutual cooperation which occurs based on market principles. [11]

Therefore, cooperation between entities is one of the basic identifiers that characterize relationships within an interorganizational network. However, there is a property that distinguishes cluster from other network relationships. Two types of relations are observed in organizations that operate based on cluster initiatives: cooperation and competition. This form of operation is defined as cooptation i.e. competition in certain areas with consolidation in other areas of market activities. [12]

However, the form of relationships in multi-entity structures is only one of the distinguishing features of these networks and clusters. With these views, the complexity of the concept of clusters should be emphasized. With the definition proposed by Porter (1998), one can conclude that clusters are viewed as a group of entities which are mutually interrelated and act in a specific geographical area. [13] These entities include: enterprises that operate using similar technological principles and resources, suppliers of services, infrastructural components and equipment as well as governmental and non-governmental institutions (universities, scientific and research centres, organizations, commercial associations etc.) which not only cooperate in specific sectors but they can also compete with each other.

Similarly, the local character of this problem has been stressed by Rosenfeld, who regarded clusters as geographical group of entities that operate in similar areas connected with each other or providing complementary services as well as

cooperating with suppliers that operate in the same market. [14] Furthermore, the literature finds principal characteristics emphasized in definitional approaches to cluster initiatives, such as geographical and sectorial concentration, cooptation, specialization, complementarity of activities, synergy, common trajectory of development, partnership between business and sectors of science and research and development and institutions from business surroundings. [15] Therefore, it can be indicated that clusters are not a common agglomeration or concentration of independent business entities, but they are networks of the cooperating entities that are interrelated with each other to different degree and in different form that function at sector level.

Analysis of the rationale for creation of clusters should be referred to what is termed a modern theory of agglomerations that points to internal economies of scale as impulses for creation of agglomerations of entities in specific location. [16] It is emphasized that a key reason for geographical concentration of innovative activity is the effects connected with locally conditioned processes of spreading knowledge, transfer of technology, flow of information or development of qualified labour. [17] An environment which is conducive to these processes is clusters, which represent an effective form of cooptation that allows for effective interactions and relationships between various entities. [18]

Similarly, Gorynia emphasized external economies of scale, with its characteristic feature being that they are a sector-specific capital, created during location of activities in the same region by the entities from the same sector. Furthermore, McCann stressed other external effects, including improved effectiveness of a specific region and attracting new business entities to a specific region. [20] It should also be noted that the entities operating within the cluster concept might show reduced transactional costs through strong relationships that occur between entities.

With relationships and interdependence of the entities grouped in a particular area might cause a reduction of costs which relate not only to reduction in costs of transport and transfer of labour, but also to reduction of costs of acquisition of information and knowledge. This is particularly important for performing the role of entities and tools for innovative activity in a specific region by clusters. It is observed in the literature that substantial expenditures connected with creation of original resources and solutions with innovative character might be reduced by creation of common innovative strategies that are based on using suitable resources and solutions from the environment. [21] Therefore, the substantial part of costs of creation of resources which are necessary for innovative activities can be eliminated through building the common base of resources that adopts e.g. the form of clusters. It should be emphasized that, through searching for various forms of competitive advantages, the combined utilization of resources from various entities can be observed. Consequently, the significance of cluster structures for innovativeness of enterprises results from their effect on development of interactions and collaboration between business entities and scientific centres.

However, it is emphasized that creation of innovativeness requires not only the network structure but the factors that describe the effectiveness of the network structure (i.e. the quality of cooperation in the network). [22] These problems are connected with the predominant method of coordination that determines the methods used by the entities that operate within network structure by organizing and controlling the cooperation. It is adopted that cluster structures are characterized by low level of formalization of agreement between the entities, with social capital and cultural conditions being essential for operation of this form of network. This is affected by the principal characteristics of the cluster i.e. loose relationships, reciprocity of services or freedom of relationships.

### 3 Characterization of clusters that operate in Poland

Empirical examinations were carried out based on the data that characterize operation of clusters in Poland. The analysis evaluated the relationships between cooperation of entities within cluster initiative and cooperation within innovative activities. Furthermore, the analysis of correlations between selected parameters of cluster initiative and innovativeness of enterprises was carried out. The population studied was divided using regional classification based on location of cluster coordinator. The entity that coordinates cluster activity should be considered as an entity that organizes and animates development of interactions, relationships and cooperation in the cluster. Diagram 1 presents data concerning the share of enterprises that cooperate within cluster initiative in % of enterprises that cooperate within innovative activities

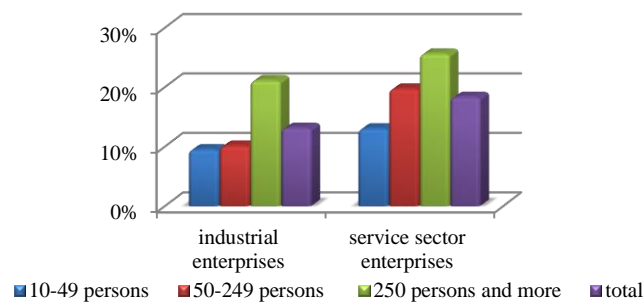


Diagram 1

Enterprises which cooperated within cluster initiative in percentage of enterprises which cooperated within innovative activities in 2010-2012

Source: author's own elaboration based on: Działalność innowacyjna przedsiębiorstw w latach 2010-2012 (in Polish: Innovation activity of enterprises in 2010-2012), Główny Urząd Statystyczny (the Central Statistical Office of Poland), Opracowania i informacje statystyczne (Statistical surveys and information), Warsaw 2013

Analysis of the size of the entities that cooperate within cluster initiatives lead to the conclusion that big entities that employ at least 250 employees are the entities which mainly cooperate in the area of innovative activity. Further, smaller entities were more willing to cooperate within cluster initiative despite the cooperation they declared in terms of innovations. This tendency was observed in both industrial entities and those from the sector of services. However, it was also found that service-providing enterprises showed greater tendency for association in clusters. It should be noted that, in general terms, the enterprises that declared cooperation in implementation of innovations were not substantially engaged in cluster initiative. The study showed that 18% of service providers and 13% of industrial enterprises were willing to connect these two aspects.

Further examination evaluated, based on correlations, the relationship between selected parameters of cluster initiative and enterprise innovativeness. Statistical variable was number of clusters that operated in individual regions (voivodeships). This characteristic was compared with such variables as: GDP in a particular voivodeship (A), % of industrial enterprises innovatively active in a particular voivodeship (B), % of service providers innovatively active in a particular voivodeship (C), % of industrial enterprises innovatively active in a particular voivodeship (D), % of innovative service providers in a particular voivodeship (E), % of industrial enterprises that implemented organizational innovations in a particular voivodeship (F), % of service providers that implemented organizational innovations in a particular voivodeship (G), % of industrial enterprises that implemented marketing innovations in a particular voivodeship (H), % of service providers that implemented marketing innovations in a particular voivodeship (I), share of incomes on sales of new products or significantly improved products in incomes on sales in total according to voivodeships /industrial sector/ (J), share of incomes on sales of new products or significantly improved products in incomes on sales in total according to voivodeships /sector of services/ (K). The results of the analysis are presented in Table 1.



	<b>Pearson linear correlation coefficient</b>	<b>Coefficient of determination</b>	<b>Statistics of the test of significance</b>
<b>A</b>	0.4120	0.1698	$t=1.6922 < t_{0.05;14}=2.145$ No statistically significant correlation between the variables studied
<b>B</b>	-0.2114	0.0446	$t=-0.8092 < t_{0.05;14}=2.145$ No statistically significant correlation between the variables studied
<b>C</b>	0.5210	0.2714	$t=2.2840 > t_{0.05;14}=2.145$ Statistically significant correlation between the variables studied
<b>D</b>	-0.3076	0.0946	$t=-1.2096 < t_{0.05;14}=2.145$ No statistically significant correlation between the variables studied
<b>E</b>	0.6313	0.3985	$t=3.0458 > t_{0.05;14}=2.145$ Statistically significant correlation between the variables studied
<b>F</b>	-0.3188	0.1016	$t=-1.2587 < t_{0.05;14}=2.145$ No statistically significant correlation between the variables studied
<b>G</b>	0.2266	0.0513	$t=0.8705 < t_{0.05;14}=2.145$ No statistically significant correlation between the variables studied
<b>H</b>	-0.0905	0.0081	$t=-0.3400 < t_{0.05;14}=2.145$ No statistically significant correlation between the variables studied
<b>I</b>	0.5616	0.3154	$t=2.5399 > t_{0.05;14}=2.145$ Statistically significant correlation between the variables studied
<b>J</b>	0.0264	0.4179	$t=0.0989 < t_{0.05;14}=2.145$ No statistically significant correlation between the variables studied
<b>K</b>	0.0006	0.1746	$t=1.7212 < t_{0.05;14}=2.145$ No statistically significant correlation between the variables studied

Table 1  
 Analysis of correlations between selected parameters of cluster initiative and innovativeness of enterprises

Source: author's own elaboration based on: Działalność innowacyjna przedsiębiorstw w latach 2010-2012 (in Polish: Innovation activity of enterprises in 2010-2012), Główny Urząd Statystyczny (the Central Statistical Office of Poland), Opracowania i informacje statystyczne (Statistical surveys and information), Warsaw 2013

The above analysis showed no statistically significant correlations between the variables studied for the most of the relationships studied. Statistically significant correlations between the variables studied were obtained only for three cases that concerned the number of clusters vs. selected parameters of innovativeness in service providers. These relationships concerned: the number of clusters that operate in the specific area and: (in the first case) % of service-providing enterprises that are innovatively active, (in the second case) % of service-providing enterprises and (in the third case) % of service-providing enterprises which implemented marketing innovations. Linear correlation coefficient in the above cases exceeded 0.5, which points to the relationship of medium character. Therefore, the coefficient of determination ranged around 30%. Verification using the test of significance was carried out based on T-student statistics confirmed a statistically significant correlation for the variables discussed. Therefore, it can be indicated that the statistical verification is consistent with previous results of examinations that point to a closer relationship of cluster initiative with innovative activity of enterprises from the sector of services.

## **4 Conclusions**

The principle base for technological progress is enterprises, universities and scientific and research institutions. These entities represent the basis for economic growth of not only regions they operate in and the areas with a more comprehensive macroeconomic aspect. Meeting the demands of competition is possible through knowledge, technologies and innovative products. It should be noted that quick transfer of technology and products at various stages of the value chain represents an essential factor in gaining the competitive advantage in a market. The environment of cooperation formed within clusters can be stimulating.

It can be also found from the empirical studies that industrial enterprises that cooperate in terms of innovative activities are not involved in the most of cases in cooperation within cluster initiative. Large entities and entities from the service sector are more willing to integrate these two areas. Therefore, it is essential to investigate the causes of low activity of cluster initiatives among the enterprises which cooperate within innovative activities. However, given more and more substantial pressure on searching for new competitive advantages in enterprises and activities aimed at orientation of public assistance towards innovative activity, it can be concluded that this area of activities in cluster initiative will become more and more important.

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