ECONOMICS OF CLUSTERS IN INNOVATIVE ACTIVITIES

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Abstract: Knowledge is decide about development of modern economy. Entrepreneurs who can use its resources they create more added value than competitors. So many political documents in UE or Poland shows on the special role of innovation as a key factor building the competitive position of enterprises but for now was no significant improvement in our position in this terms compared to other leading areas. An obstacle in introducing innovative technological and product solutions in enterprises is most of all high cost of developing and implementing them. Lack of developed legal and institutional infrastructure which favors the implementation of new ideas causes that investing in new services and creating new innovative ventures is too risky. The article attempts to assess the application of cluster initiatives for the development of innovative activity and making of innovation.

Keywords: Innovation, Internet of Things, Cluster, Industry 4.0, Economy

Introduction

Innovative activity it a most important thinks in the development of the economy, society, ecology or development of technics and technology. This type of activity is understood as an activity focused on increasing the tendency to create, implement and apply innovations to the daily activities of each enterprise. It is a complicated process, requiring significant financial outlays, which is still evolving and each of the potential innovators is looking for effective ways to implement it.

A developed and modern economy, development of enterprises, decent working conditions, good living conditions, a knowledge-based society are invariably the most important thinks of functioning every country. Polish economy, after many years of experience and couple years functioning in differential legal systems does not fully achieve
these objectives. Still, the most important challenge for the Polish economy is an attempt to reduce excessive structural differences between Poland and highly industrialized countries, especially European. It is still necessary to build awareness and develop knowledge among the society as well as to research and implement research results of innovative processes, without which the modern economy cannot function efficiently. An indispensable condition for the implementation of shaped trends is the consolidation of entrepreneurial and innovative attitudes and the pursuit of these attitudes should be based on integrated knowledge development using available technical, economic, organizational and administrative standards. An important task is observation of changes in the adaptation mechanism of various entities towards innovative activity understood as the tendency to introduce various forms of innovation in individual spheres of management. The analysis of this mechanism should answer the question, which and to what extent economic and social conditions are able to stimulate on the one hand, and restrict the innovation activity of enterprises on the other.

There are many economic and social determinants of innovative processes in enterprises. We have many economic and social determinants of innovative processes in enterprises. Among many solutions, cluster activity is often presented, understood as a spatially concentrated group of organizations of related sectors that are connected with each other by a network of horizontal and vertical interdependencies, cooperating with each other (sometimes also competing) creating and disseminating innovative solutions. Innovations are the result of cooperation of R&D units that take into account the market needs of consumers, which most often manifests itself in a specific structure of demand. New products (breakthrough innovations) are manifested in a specific supply structure. Innovative activity is therefore the sphere of human activity, without which civilization development is impossible. The choice of forms of functioning of enterprises on the market is a complex process, which requires the definition of selection criteria for many factors that will determine the implementation of specific strategies.

The main purpose of the article is an attempt to assess and analyze the effectiveness of the economics of cluster operations in Poland and its impact on the creation and diffusion of innovation. The main assumption is the thesis that the cluster is currently the best form of activity of entities on the market, the aim of which is to increase the level of innovativeness of the area in which they operate, stimulating the socio-economic development of the region and the country, thus improving the competitive position of the country in comparison to other countries in the European perspective and international.
Innovative activity in the functioning of Clusters.

Work on creating, assessing and implying innovation is a premise for determining development directions and changing key innovation diffusion programs. Industrial (or manufacturing) activity should play a significant share in every economy, it should be an important force in implementing modern solutions. Enterprises exposed to competition are forced to seek pragmatic and new solutions to survive in a dynamically changing environment. Large organizations, often with global reach, have the greatest chance of innovation.

Unfortunately, the structure of enterprises in Poland is dominated by micro and small entities with a small number of medium-sized enterprises. It is micro and small enterprises that form the basis of the Polish economy. They are the initiator of new jobs and an accelerator of new technologies development. It is well known that in order to survive and be competitive, small entities are forced to seek cooperation and cooperation with others. By creating larger place of enterprises of diverse nature we enable to flow of knowledge and information between enterprises, in which the complementarity of available and hidden knowledge, its mutual interactions are the basis for creating new (modern) solutions of a socio-economic nature. It should be noted that knowledge is the basic carrier of innovation.

We must remember that knowledge is a most important thing in making innovation (Januszkiewicz and Cywiński, 2019, p. 37). The increase in the role of knowledge is associated with the development of technology, integration of education with production and services, the growing scientific and technical potential, innovative enterprises, or the intensification of mutual interaction of knowledge on individual spheres of human life (Obrębski, 2002, p. 44). In addition to the necessity of implication of knowledge in the activities of each entity, there are a number of barriers that each organization must deal with. These include systemic and political-legal solutions, phenomena related to the seasonality of demand or spatial geography. The development of business structures can contribute to activating the society to create an innovative environment that uses knowledge. Introducing innovation in the organization, involvement in individual stages of the innovation process is the result of several factors affecting both the organization and the entities operating in its structures. The positive attitude of entities to the processes of creating and implication of innovation occurs when the configuration of factors is such that the company wants, can and is able to create and implement innovations with balanced economic efficiency (Obrębski,
Factors stimulating the introduction of innovation can be found both inside the company and in its external environment. Many Author’s agree that determinants can occur on many levels than economic. We can often found the following determinants of innovation introduction by (Obrębski, 2002, p. 101):

- internal processes in the human capital of the organization such as motivations, intellectual and creative predispositions,
- socio-political climate,
- scientific and technical, economic, organizational and educational information system,
- legal and administrative standards,
- planning systems, market mechanism, prices, economic and calculation of the enterprise.

Looking from the perspective of the organization's functioning, economic factors are still the most important factors. A large role in business, in the context of creating and implementing innovation in business, is played by the market, which plays an inspiring and verifying role. The inspirational function of the market can be talked about only when the market decides, among others, about the need to apply a new solution, the direction of search and selection of the idea, the date of its introduction on the market, the scale of application or the moment of withdrawal of the product from production / market (if necessary) or alternatively, replace it with a new one. Systemic solutions, such as the financial system, credit, tax and monetary system are important for the culture of innovation, conducive to their creation and human creativity. In addition to the prevailing opinion, taking into account primarily economic factors should also be included (Januszkiewicz and Cywiński, 2019, p. 89):

- enterprises or organization flexibility,
- ability to read and forecast market behavior,
- size of the enterprise or organization,
- continuity of management and the idea that accompanies the creation of climate change and development,
- ready and motivation of management for make a risk,
- height of the market entry threshold.

Factors that are independent of the actions taken in the enterprise and affecting the climate of innovative activity include, among others (Januszkiewicz and Cywiński, 2019, p. 75):
• competitors on the market,
• market upward trends,
• pace of technical progress,
• economic situation,
• influence of the state on the economy.

Factors determining the creation and implementation of innovations can be considered because of the way they affect the entity's attitude to innovation, whether they shape the ability, skills and willingness of staff to implement innovation. One of the most important sources of incentives for implementing innovation is the results of own research and development works, supplemented with inventive and rationalizing activities, as well as foreign technical thought (Cywiński, 2019, p. 47). The process of providing and selling products is based on innovative technologies. A complementary inspiration and another determinant is the systematic observation of what is happening in the markets, marketing research, presence at fairs, conferences and exhibitions (Pomykalski, 2001, p. 26). The Internet and ICT (Internet and Communications Technology) are useful, in which subsequent entities test their capabilities, and its range on the market will only progress. ICT technologies have greatly facilitated access to information, both about market trends and the experience of others, but above all have become an opportunity to develop innovative skills among employees and potential innovators.

Innovation policy propagated in OECD documents is understood as one of the economic policies, which covers the following areas: (Frascati Manual, 2018, p. 49)

• strengthening connections in the national innovation system,
• shaping and developing the capacity to innovate, both in the field of technics and technology and organization with education as well,
• optimal use of innovation as a basic factor of economic growth and increasing the number of sustainable jobs,
• making structural technical change, technological and quality change in industry,
• use of international cooperation and globalization processes in economy.

By implying the above statements, a belief is being built to effectively influence the development of innovation, a number of measures and elements should be used, such as: (Janasz, 2005, p. 131):

• caring for the development of education by educating at various levels,
• development of science through grants or national research programs,
• development of infrastructure supporting innovative activities, such as technology parks, technical and technological assistance networks, innovation centers or technology transfer centers,
• universal access to information by creating information centers and networks as well as libraries,
• creation and access to specialist consulting services for small and medium enterprises,
• easier access to financing of innovative enterprises through loans, tax or loan guarantees,
• legal regulation such as intellectual property protection or monopoly control.

The factors favoring the innovativeness of an enterprise certainly include various forms of innovation transfer resulting, among others, from international economic relations, such as: (Penc, 2008, p. 67)
• exchange of goods with foreign countries, because in best products is objectified scientific and technical thought,
• license export and import,
• exchange of technical documentation not covered by license agreements,
• rendering services to or by a foreign entity, which may include managerial contracts of franchise agreements,
• conducting research and development abroad, joint R&D projects with foreign enterprises, studying foreign literature,
• training personnel abroad or by foreign specialists, employing foreign employees as well as internships and apprenticeships or personal contacts with foreign specialists,
• various forms of cooperation in production with foreign partners, including production ordering, co-production, construction of complete facilities abroad,
• creation of joint enterprises,
• undertaking foreign direct investment.

Various forms of technology transfer from the environment have a positive effect on the increase of enterprises innovativeness and constitute a significant source of supply for pro-innovative solutions. Particular interest today are Cluster solutions, that were initiated already in the nineties of the twentieth century by M. Porter (1998, p. 80).

Clusters are defined as aggregation of cooperating organization in a selected geographical area, connected with each other by means of suppliers, enterprises from similar
sectors or institutions. Clusters can strengthen regional competitiveness in three ways: (Porter, 1998, p. 82)

- increasing the productivity of operating organizations in the Cluster,
- increasing the level of productivity (and thus innovation),
- creating better (favorable) conditions for the creation of new enterprises.

Very often, to analyze the impact of the environment on the innovation activities of enterprises operating in Cluster we use such as Porter diamond (Porter, 2009, p. 226). A characteristic feature of Clusters is the fact, that the organizations that operate in them are competitors to each other, but at the same time, they cooperate in areas where it is possible to achieve synergies. Synergy in this case is primarily characterized by diffusion of know-how, increasing productivity, openness to innovative activities, the ability to absorb innovation or attract new resources. Competition does not exclude cooperation, which can become a driving force for development. A great example is the Silicon Valley in the US, which attracts many talented IT professionals who enable the development of information technology on a global scale.

Apart from classic enterprises, Cluster interdependence networks include scientific organizations and institutions, which enable building large innovation potential. Links can be informal, often functioning on the basis of Staff turnover within the Cluster. Importantly, there is never a certainty that a cluster will develop and function for years. You might as well not live up to expectations and won’t be able to compete (Porter, 2001, p. 305).

The theory of the creation or disappearance of a Cluster focuses mainly on geographical factors (location) and effects to concentration of production. Distraction occurs when there is a need to locate the Cluster to new, developing markets, in the event of obtaining dispersed workforce or in the place of existing production, there is overcrowding and high charges (local, rent, etc.). The Cluster’s activity can be compared to the life cycle of a product in economic and here it is possible to assess its development (embryonic, growth, mature, declining). (DTI, 2004, p. 43)

The Cluster is an opportunity to obtain information about new sales markets, about new changing expectations of buyers, new trends, new technologies or new business management instruments. On the other hand however, disadvantages include the shortage of employees, competing enterprises present in the Cluster for employees and higher costs of production factors (for example real estate costs). (Grycuk, 2017, p. 140)

The economics of Cluster operation can be defined based on several factors (Podgórska, 2013, p. 8):
• resources,
• processes,
• services for Cluster participants,
• types of cooperation undertaken with the environment.

Given the above factors, it is possible to assess the functioning of Clusters in Polish socio-economic realities. Currently, there are approx. 3,5 thousand enterprises associated in approx. 130 Clusters in Poland (for 2 million in total in sector of micro and medium enterprises). (Wielec, 2018, p. 6)

Since 2010, the number of Cluster and organizations operating in them is constantly growing, number of people working on modern solutions is almost 290 thousand employees. They work take place in sector-industry specializations that are key to the development of the economy. The assessment of functioning and management of cluster initiatives is estimated to be good with an upward trend and all indicators oscillate within 60% efficiency (C404/01, 2019, p. 5). This is a good result, despite the reduction in the availability of public funding. Undoubtedly, organizational strength and the level of owned infrastructure are the strengths of the existing Clusters. Highly rated is IT infrastructure, training, R&D with international potential. Cooperation of clusters within common value chains has increased over the years from 40% to 65%, undertaking joint marketing initiatives to almost 80%. On average, however, the results of research and development look like, which significantly depend on constant financial outlays.

The aspect of cooperation on science is particularly visible. Clusters that cooperate with a minimum 10 scientists achieve positive results of their activity. The ones that cooperate with 40 scientists achieve significant effects.

Pro-innovative services are provided by 75% of Clusters. As part of their activities are carried out the following projects focused on creating innovations (Wielec, 2018, p. 27):

• monitoring of technological processes,
• technological audits,
• consultancy in the field of industrial protection,
• specialized training,
• technological consulting.
Conclusions

As far as possible, every enterprises should take all actions that are aimed at transferring scientific and technical – technological ideas into market success through a constant transfer of knowledge and information between organizations, especially knowledge acquired form R&D and transferred through interpersonal contacts at various levels. The conditions for the emergence of innovative processes may have a complex sociological and psychological nature, but also philosophical, historical, organizational or economic nature. Of course, they change over time, each of them may have a different meaning and impact, but they are undoubtedly dynamic and depend on factors that at a given moment have an impact adequate to the political and economic situation in the country (Janasz, 2008, p. 42).

In an attempt to systematize stimulants of innovative activities, both dependent on (internal) and non-dependant (external) organizations, which may take the following form (Januszkiewicz and Cywiński, 2019, p. 86):

- the natural environment in which we operate,
- the state of scientific and technical knowledge,
- condition of technical infrastructure,
- organizational level of entities on the broadly understood market,
- consumer or user requirements,
- economic factors,
- sociological factors,
- psychological factors,
- socio-political situation.

The foundations of business operations create the law of nature and the environment in which we live. Nature has most universal character and affects the surroundings and organizations regardless of the type of economy, market sector or actions taken. Exogenous factors such as social, political, psychological, sociological and economic factors are important. In Poland, thanks to the application of cluster initiatives, it was possible to implement diversified and competitive activities on the market, which allowed verification of new product and service solutions. Although the trend in creating innovation is upward, it is currently assessed as average, mainly due to the constant need for financial resources. Thanks to cooperation we have manager to create an effective climate for creating new solutions, especially of a marketing and organizational nature. Thanks to our activity in Cluster, we can
suport and shape pro-innovative activities, determine its direction, strength and efficiency, stimulating other organizations to develop.

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