DEVELOPMENT OF CLUSTERS IN POLAND AND THEIR ROLE FOR ECONOMIC COMPETITIVENESS

Arkadiusz Michał Kowalski
World Economy Research Institute, Warsaw School of Economics
al. Niepodległości 162, 02-554 Warsaw, Poland
E-mail: arkadiusz.kowalski@sgh.waw.pl

—Abstract —

During an era of globalization, technological development and changes in competition have transformed the role of traditional factors of industrial location. It may seem that the possibilities of speedy re-locations of different factors of production enable enterprises to locate their economic activity anywhere to realise competitive advantage. However, in reality we observe a tendency for spatial concentration of economic activity and clusters are becoming a striking feature of increasingly complex economy. The paper focuses on the process of development of clusters in Poland and their impact on the competitiveness, which may be analyzed from micro-, meso- and macroeconomic perspective. After joining the European Union, there has been a dynamic creation of clusters in different sectors of Polish economy. The aim of the research is to identify the most important benefits resulting from that process. One of the greatest advantage from clusters is that they constitute the best diagnosed method for stimulating the horizontal cooperation in the economy, which is a central element in modern innovation processes. This assumption is verified in this article on the basis of data collected in survey research conducted in 2012 on 50 cluster coordinators and 350 firms belonging to cluster initiatives. Clusters positively contribute to economic competitiveness, so they can act as growth poles for the economy at regional and national level, which is a reason for the popularity of the concept of cluster-based economic policy. Since cluster concept has become a significant element of modern economic policy, it is important to examine the instruments used in Poland in order to support creation and development of clusters.

Key Words: clusters, competitiveness, growth poles, innovation

JEL Classification: D22, R12, R58

1. INTRODUCTION

Globalization, technology developments and new societal challenges are constantly changing the rules of the game in the economy. A generally observed phenomenon is that most industrial and commercial activities, especially in high-tech sectors, tend to be more and more clustered together in space. The paper focuses on clusters, which have emerged over last two decades as an important field of research in the topics of economic competitiveness. Definition of cluster was given by Porter (1998:197), according to whom it is a "geographic concentration of interconnected companies, suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standards agencies, and trade associations) in particular fields that compete but also cooperate". The most important characteristic of clusters is geographical concentration of enterprises specializing in specific branches, leading to intelligent specialization of regional economy.

After joining the European Union in 2004, there has been a dynamic increase in the number of cluster initiatives in Poland. The aim of this paper is to analyze the pattern of clustering in this country, especially by examining if cluster formation is restricted only to high-tech and medium-high tech branches or if they are also initiated in medium-low and low technology industries. Another objective is to analyze how clusters contribute to economic competitiveness. It will be done by examining benefits from clustering at micro-, meso-, and macroeconomic levels. The most important advantage from clusters is their role in innovation processes. Clustering stimulates innovativeness by fostering knowledge flows, technology transfer, mutual learning and commercialization of research (Kowalski,2010). In this paper, there are presented the results of survey research answering the question if cluster membership influences technological advancement of firms' activates and if it contributes to some important elements of innovation process, like effective communication, cooperation or trust. The study ends with introducing the concept of cluster-based economic development policy, which is encouraged by the impact of clustering on economic competitiveness.

2. THE IMPACT OF CLUSTERS ON ECONOMIC COMPETITIVENESS

The concept of competitiveness is a multidimensional phenomenon, as evidenced by the large number of existing in the literature attempts to define this concept. For the purposes of this article, the definition proposed in the OECD study is

adopted, according to which competitiveness is understood as "the ability of companies, industries, regions, nations or supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis" (Hatzichronoglou,1996:20). We may analyze the impact of clusters on economic competitiveness at 3 levels: microeconomic (from the perspective of single company), mesoeconomic (taking into account the benefits from clustering experienced by the whole sector or from the perspective of regions) and macroeconomic (analyzing the impact of clusters on the whole national economy).

From microeconomic perspective, being a member of cluster structure may help businesses, especially SMEs, to improve their competitive positions. Porter (1998) mentions three broad dimensions, in which clusters influence competitiveness at the micro-level: by improving the efficiency and productivity of companies, increasing the level of innovation, and inspiring the formation of new businesses. Deepening the analysis, it is possible to indicate different examples of the impact of clusters on competitive position of a single enterprise, like:

- reducing the level of uncertainty and risk in business activity,
- greater access to knowledge, technology, skills and other kinds of scarce resources, thanks to their complementarities in cluster structures that facilitate mutual exchange or acquisition between partners,
- more opportunities to undertake joint R&D activities,
- more opportunities to identify market niches or access foreign markets,
- increasing the qualifications of the staff as a result of trainings and conferences organized by cluster coordinators,
- increasing production capacity and operational flexibility through greater opportunities to reallocate resources and to use vacant capacity of other economic entities operating in the cluster (Kowalski,2011).

Mesoeconomic perspective includes sectoral and regional dimension. The concept of clusters is strictly connected with both of them since their main characteristics is spatial concentration of economic activity in specific sectors. Developing cluster structures impacts mesoeconomic competitiveness because of:

- concentration of different assets in branches, in which region has competitive advantages, leading to intelligent regional specialization,

- acceleration of the flow of knowledge and specialized know-how, as well as innovation diffusion and technology transfer to and within the region,
- greater level of cooperation among science and industry, which may contribute to solving some structural problems of regional economy,
- developing specialized labor market in the regional economy,
- increasing locational attractiveness of the regional economy and attracting foreign direct investments,
- developing social capital in the region, including relational capital.

It is the most difficult task to identify and measure the impact of clusters on competitiveness from macroeconomic perspective since national economy goes beyond the functioning of cluster structures, which are regionally constrained. However, we may assume that the consequence of described above benefits from clusters for firms, sectors and regions is their impact on competitiveness at the macro level. Adoption of this assumption makes it possible to identify various types of benefits of clustering for the national economy, which include:

- stimulating economic activities, which is reflected in GDP growth, an increase in employment and reduction of unemployment rate,
- higher level of innovativeness of the national economy and quality of human capital, which may be reflected for example in Human Development Index (HDI),
- an increase in exports and an improvement of the current account of the balance of payments,
- inflow of financial capital due to increased rate of foreign investments.

3. Clusters development in Poland

3.1 Classification of clusters in Poland according to technological level

There has been a dynamic increase in the number of cluster initiatives in Poland last years. They are formed in modern, as well as in traditional branches of the economy. This is proved by table 1, showing the examples of cluster initiatives in different manufacturing industries, classified according to their global technological intensity.

Table 1: Classification of clusters in Poland according to their main area of specialization

Technological intensity	NACE Rev. 1.1	Examples of clusters
High technology	24.4 Pharmaceuticals	Life Science, Cracow
	30. Computers, office machinery	Mazovia ICT Cluster, Warsaw
	32. Electronics-communications	Cluster New Technology (NT) Hills
	33. Medical, precision and optical instruments	Mazovian Photonic Technology Cluster "Oprocluster", Warsaw
	35.3 Aerospace	Avation Valley
Medium-high technology	24. Chemicals	Wielkopolska Chemical Cluster
	29. Non-electrical machinery	Cluster of Innovative Manufacturing Technologies "Cinnomatech"
	31. Electrical machinery	
	34. Motor vehicles	Green Cars Cluster
	35.2 Railway equipment	Southern Railway Cluster
Medium-low technology	23. Coke, petroleum and nuclear fuel	Cluster "Europolbudatom"
	25. Rubber and plastic products	Tarnow Industrial Cluster „Plastic Valley"
	27. Basic metals	Metal Cluster „Metalika", Wałcz
	28. Fabricated metal products	Eastern Cluster of Metal Processing
	35.1 Shipbuilding	Polish Yachts Cluster
Low technology	15. Food, beverages	Organic Food Valley Cluster in Eastern Poland
	17. Textile	Cluster of Innovation Industry and Fashion, Łódź
	18. Clothing	
	21. Pulp, paper products	Mazovia Printing and Advertising Cluster "Colorful Valley"
	22. Paper printing	
	20. Wood	North-Eastern Wood Cluster; Wielkopolska Furniture Cluster
	36. Furniture	
	37. Recycling	Waste Treatment and Recycling Cluster

Source: author's compilation

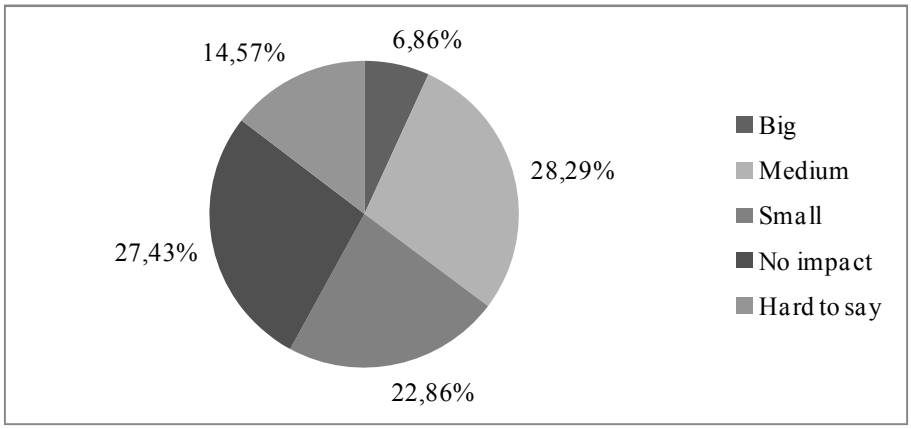
Many economists highlighted the importance of clusters in high-technology industries (Bresnahan,2001), which are based on the transfer of scientific research results, as well as knowledge and technology into the economy and which are characterized by high expenditures on R&D. However, table 1 shows that cluster initiatives may be developed in different sectors, characterized by all levels of technological intensity. The fact that cluster is functioning in low or medium-low technology sector does not mean that it does not have an impact on the innovativeness of participating companies. In reality, cooperation with research centers and other companies in cluster opens new development opportunities for companies operating in all sectors, including low or medium-low technology

sectors. Therefore, clustering helps to modernize traditional industries and solve different structural problems in the economy. Some clusters are located in relatively poor regions of eastern Poland. One example is the Aviation Valley, a flagship Polish cluster where most actors are located in Podkarpackie province. This example shows that there are some attractive locations for industrial development even in relatively underdeveloped regions. These clusters can act as "growth poles," spreading development impulses to surrounding areas.

3.2 The impact of clusters on the innovativeness and competitiveness of firms in light of the survey research

The verification of the role of clusters for the competitiveness and innovativeness of the economy in Poland is based on data from a survey research, which was completed by the author in 2012. Two methods for conducting survey research were used: CATI (Computer Assisted Telephone Interview) and CAWI (Computer Assisted Web Interview). Study sample size was 400 respondents, including: 50 coordinators of cluster initiatives operating in Poland, and 350 companies being the members of cluster initiatives. Data on business assessments of the impact of cooperation in clusters on the level of technological advancement of surveyed firms' activities are presented in figure 1.

Figure 1: The impact of participation in cluster initiatives on the level of technological advancement of firms' activates [n=350]

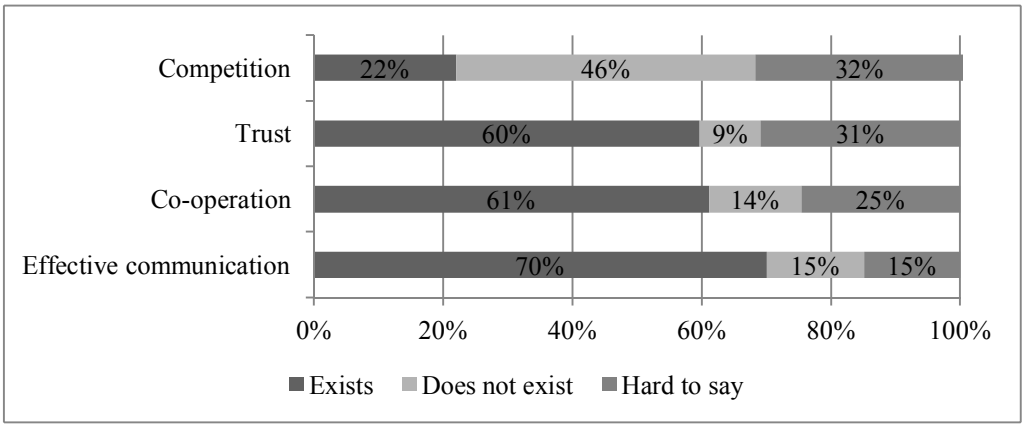


Source: own research.

The positive impact of cluster membership on the level of technological advancement was declared by 58% of companies, out of which 6.86% assessed it

as high, and 28.29% as average. According to theoretical models, one of the key characteristics of clusters, are: communication, trust, cooperation and competition. The results of research survey, showing to which extend these elements occur in Polish cluster initiatives, are shown in the figure 2.

Figure 2: The characteristic aspects of the relationship with partners within Polish cluster [n=350]



Source: own research.

The main positive aspect of relationships in clusters is effective communication between partners, which was indicated by seven out of ten respondents. Slightly fewer companies indicated the presence of co-operation in their cluster initiative (61%) and mutual trust (60%). Only 22% of businesses surveyed confirmed that they compete with their partners from clusters. However, we must remember that according to theoretical models, there is both co-operation and competition in clusters, which is defined as coopetition (Jankowska,2011). Approximately 15% of the respondents indicated a lack of cooperation and mutual trust between the partners. However, given generally low degree of cooperation and trust in the Polish economy, these results should be considered very good.

4. Clusters as growth poles for the economy – implications for economic policy

Economic activity, especially in high-tech sectors, tends to concentrate around metropolitan areas and specialized regional clusters (Sölvell,2008:5-6). This phenomena can be explained by the theory on growth poles, according to which "growth does not appear everywhere at the same time; it manifests itself in points

or poles of growth, with variable intensities; it spreads by different channels with variable terminal effects for the economy as a whole" (Perroux,1955:56). Growth poles may be understood as concentrations of business activity around a central core that are able to impact growth for them, as well as that of the surrounding area. Clusters act as "growth poles," spreading development impulses to surrounding areas. The resulting competitive advantage of the location can be revealed at a national and often international level. Therefore, developing clusters is a good answer to the contemporary paradigm of endogenous growth, because they are an efficient way to mobilize internal potential of the regional economy and pool resources, which facilitates the achievement of an appropriate critical mass of investments.

A positive role played by clusters in determining the competitiveness of the economy is a reason for the popularity of the concept of cluster-based economic development policy, originated by OECD (Roelandt,1999). The concept of clusters as a policy tool is relatively new, with growing interest in networking observable especially in terms of innovation policy. We may observe the influence of this approach in EU economic policy, in which supporting clusters is becoming an important element. It is also among the priorities of the Europe 2020 Strategy, which one of the objectives is to "improve the business environment, especially for SMEs, including through reducing the transaction costs of doing business in Europe, the promotion of clusters and improving affordable access to finance" (European Commission,2010:17). Accession to the European Union in 2004 resulted in formulating cluster policy in Poland. The assumption for that policy is based on bottom-up approach, meaning that clusters are driven mainly by market forces and they cannot be started from scratch by government intervention. Supporting clusters in that country is implemented at three levels:

- regional level, by semi-government, dedicated mostly to embryonic clusters,
- national level, mainly by "Operational Programme Innovative Economy, 2007-2013", co-financed by European structural funds,
- European level under different UE programmes, for example in the framework of European Cluster Alliance under PRO-INNO Europe Initiative, dedicated mostly to support internationalization of clusters' activities and develop transborder cooperation between cluster initiatives.

5. CONCLUSIONS

The results of the research presented in this paper give a rather positive image of clusters as a type of business relationship that influences economic competitiveness, which may be analyzed at different levels. At microeconomic level, clusters increase the efficiency and productivity of companies, as well as their level of innovativeness. It was proved by the results of survey research from 2012, in which most of the enterprises positively evaluated the impact of cluster membership on the technological advancement of their activities. Clustering plays an important role in enhancing effective communication between partners (it was confirmed by 70% of surveyed firms), cooperation (61%) and trust (60%), which are crucial elements of modern innovation processes. Mesoeconomic level, including sectoral and regional dimensions, is especially relevant for clusters, which are geographic concentrations of economic activity in specific branches. The main benefit of clustering from this perspective is driving intelligent specialization of regional economies through spatial concentration of different assets in the sectors where the region has competitive advantages. Identification of different advantages from clustering occurring at micro- and mesoeconomic levels permit the conclusion that clusters influence macroeconomic competitiveness, contributing to GDP growth, reduction of unemployment rate, higher level of innovativeness of the economy, etc. This is a reason for undertaking different actions supporting clustering and formulation of the concept of cluster-based economic development policy, which influences public intervention in the European Union and its member states, including Poland.

ACKNOWLEDGMENTS

The survey research, which was used in this paper, was conducted in 2012 in the framework of habilitation research project "The development of clusters in Poland and their importance for the innovativeness of the economy" under contract No. 3931/B/H03/2011/40 with the National Science Center in Poland.

BIBLIOGRAPHY

Bresnahan, Timothy, Alfonso Gambardella, AnnaLee Saxenian (2001), "Old Economy Inputs for New Economy Outputs: Cluster Formation in the New Silicon Valleys", *Industrial and Corporate Change*, Vol.10, No.4, pp.835-860.

European Commission (2010), "Communication from the Commission. Europe 2020. A strategy for smart, sustainable and inclusive growth", Brussels, COM(2010) 2020 final.

Hatzichronoglou, Thomas (1996), "Globalisation and Competitiveness: Relevant Indicators", *OECD Science, Technology and Industry (STI) Working Paper 5*, Paris: OECD.

Jankowska, Barbara (2011), "Implications of coopetition for international competitiveness and internationalization of firms: perspective of SME and large companies", *International Journal of Business and Management Studies*, Vol.3, No.1, pp. 49-58.

Kowalski, Arkadiusz Michał (2010), "The Role of Clusters in Enhancing Ties between Science and Business", (in: Marzenna Anna Weresa-Ed., *Poland: Competitiveness Report 2010. Focus on Clusters*), Warsaw School of Economics Publishing, Warsaw, pp.305-316.

Kowalski, Arkadiusz Michał (2011), "Innovativeness of Poland's manufacturing" (in: Marzenna Anna Weresa-Ed., *Poland: Competitiveness Report 2011)*, Warsaw: World Economy Research Institute, Warsaw School of Economics Publishing, pp.321-347.

Perroux, François (1955), "Note sur la notion de pole de croissance", *Economie Appliquee*, Vol.8, pp.307–320.

Porter, Michael Eugene (1998), On Competition, Boston: Harvard Business School Press.

Roelandt, Theo, Pim den Hertog, (1999), "Cluster analysis and cluster-based policy making: the state of the art", (in: Theo Roelandt, Pim den Hertog-Eds., *Cluster Analysis and Cluster-based Policy: New perspectives and Rationale in Innovation Policy*), Paris: OECD, pp. 413-427.

Sölvell, Örjan, Christian Ketels, Göran Lindqvist, (2008), "Industrial specialization and regional clusters in the ten new EU member states", *Competitiveness Review: An International Business Journal incorporating Journal of Global Competitiveness*, Vol.18, No. 1/2, pp.104-130.