

CLUSTER DEVELOPMENT IN POLAND A DIAGNOSTIC STUDY

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Key words: cluster, cluster attributes, cluster development.

A b s t r a c t

The objective of this study was to evaluate cluster development in Poland based on the results of research conducted over the last decade as well as current information published by the Polish Agency for Enterprise Development and the "Portal Innowacji" web portal. Research results show that Polish clusters are relatively new structures, and the majority of them are still at the embryonic stage of development. The structure of some Polish clusters differs from that described in the classical cluster theory, while the attributes of other are typical. In Poland, cluster development is financed mostly from the European Structural Funds. Thus, changes in EU policy and focus on international cluster initiatives may considerably slow down the process.

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Słowa kluczowe: klastr, atrybuty klastra, rozwój klastra.

A b s t r a c t

Celem artykułu jest próba oceny rozwoju klastrów w Polsce na podstawie badań nad nimi prowadzonych w ostatniej dekadzie, a także bieżących informacji publikowanych m.in. przez PARP oraz internetowy "Portal Innowacji". Z badań wynika, że klastry w Polsce należą do struktur młodych, w przeważającej większości znajdujących się w fazie embrionalnej. Część zidentyfikowanych gron w swojej konstrukcji odbiega od teorii klasteringu, a część ma atrybuty dla nich charakterystyczne. Rozwój klastrów w Polsce jest stymulowany głównie przez wsparcie finansowe oferowane w ramach funduszy unijnych. Zmiana polityki UE i skupienie się na finansowaniu przede wszystkim klastrów o zasięgu międzynarodowym może ten rozwój znacząco ograniczyć.

Introduction

Clusters have become a topical issue and the subject of extensive scientific research over the past decade. In the US alone, approximately a thousand scientific papers on clusters were published at the beginning of the 21st century, and in 2003 the Clusters Profile website of the Institute for Strategy and Competitiveness at Harvard Business School provided a set of standardized descriptions of more than 800 industry clusters in 52 countries (KETELS 2003, p. 2). Recently an increased interest in clusters has been accompanied by changes in the views of both theoreticians and practitioners of economic development. For many years, cluster development was believed to be determined primarily by macroeconomic factors. Today the above approach seems oversimplified, and the ongoing debate points to the importance of microeconomic factors and institutions responsible for regional growth. The practical manifestation of this approach is the diamond model developed by Michael Eugene Porter, described in his famous book *The Competitive Advantage of Nations* (1990), proposed as an analytical tool to capture the quality of business environment at a given location (KETELS 2006, p. 119).

At present clusters attract the attention of researchers from many branches of science, including economic sciences and management. Clusters contribute to enhancing the competitiveness of enterprises and regions under conditions of knowledge-based economy, globalization and a turbulent business environment. According to M. E. Porter, management guru and promoter of cluster policies, the competitive advantage of enterprises is largely dependent on external factors therefore a major role is played by supporting institutions and business entities as well as by location. He claims that “clusters are a driving force in increasing exports and magnets for attracting foreign investment” (PORTER 2001, pp. 246–247). The growing popularity of clusters in Poland is confirmed by an increasing number of publications and books addressing various aspects of cluster development.

The objective of this study was to evaluate cluster development in Poland based on the results of research conducted over the last decade as well as current information published by the Polish Agency for Enterprise Development and the “Portal Innowacji” web portal.

Definition of a cluster

The term “cluster” is used in different branches of science, including geography, medicine, physics, informatics, and music. The English word “cluster” is usually translated into Polish as “kiść” or “grono” (Webster’s New

Encyclopedic Dictionary 1997). In Poland, the concept of cluster was popularized in 2001 by M.E. Porter's book *On Competition*. The term "business cluster", also known as an industry or a competitive cluster, was introduced already at the beginning of the 1990s by M.E. Porter, whose analyzed the potential of clusters to affect the competitive advantage of companies and regions based on their geographical location, while Paul Krugman focused on the importance of international trade and geographical economics (PORTER 1990, KRUGMAN 1991).

Clusters are defined in a variety of ways in the professional literature, depending on the perspective taken. According to one of the most common and most quoted definitions, proposed by M.E. Porter, a cluster is "a geographic concentration of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions" (e.g. universities, standards agencies, trade associations) in a particular field that compete but also cooperate (PORTER 2001, p. 246). Clusters include companies in the same or a related field, located within a close geographical proximity, able to gain the competitive advantage of a location, including access to specialized human resources and services, knowledge and collective learning, in order to achieve better economic results (PORTER 1998, pp. 214–223).

Table 1 present the most common and widely accepted definitions of a cluster, relying on Porter's approach.

According to Jacobs and De Man, different definitions of a cluster can be classified into one of the following three categories:

1. Clusters as geographic or spatial concentrations of economic activity of a group of companies that operate in related market segments and cooperate with universities, research and development centers. This approach is popular among regional policy makers.

2. Clusters as vertically integrated production chains, in which adjacent stages of the production process form the core of the cluster (e.g. supplier – producer – distributor – consumer chain). The vertical interconnections between businesses are based on Porter's value chain approach and the French concept of *filière*¹.

3. Sectoral clusters (e.g. chemical clusters) or segmental clusters (e.g. food clusters). According to this approach, clusters of businesses operate together within the same commercial sector or segment (JACOBS, DE MAN 1996, p. 426).

According to the specialists dealing with business clusters, the following four elements are common to all high performing clusters (Cluster Navigators Ltd.):

¹ The term "filière" was developed in France by researchers who studied spatially concentrated production chains. The concept, proposed by J. Montfort, refers to a system in which goods and services are supplied to the end user in the production chain, based on a cooperation of interconnected but independent economic entities (MONTFORT 1983).

Table 1

Definitions of a cluster

Year/Author	Definition
1994 REDMAN	a pronounced geographic concentration of production chains for one product or a range of similar products, as well as linked institutions that influence the competitiveness of these concentrations (REDMAN 1994, p. 37)
2004 UNIDO	sectoral and geographical concentrations of enterprises that produce and sell a range of related or complementary products and, thus, face common challenges and opportunities, including access to specialized human resources and suppliers, collective learning, etc. to enhance competitiveness (UNIDO 2004)
1995 ROSENFELD	a loose, geographically bounded agglomeration of similar, related firms that together are able to achieve synergy. Firms “self-select” into clusters based on their mutual interdependencies in order to increase economic activity and facilitate business transactions (ROSENFELD 1995, p. 12)
1995 RABELLOTTI	a geographic concentration of specialized firms (mostly small- and medium-sized enterprises), in the same or a related sector, based on market and non-market exchange of goods and information, connected with a network of public and private local institutions supporting the cluster. Cluster members feel to be part of a cohesive professional community (RABELLOTTI 1995, p. 30)
1996 JACOBS, DE MAN	a network of suppliers that surround a core enterprise (JACOBS, DE MAN 1996, p. 425)
1996 ENRIGHT	a group of enterprises and institutions whose membership in the group is an important element of competitiveness of individual firms (members). Firms in a cluster are held together by buyer-supplier relationships, common technologies, distribution channels or common labor pools (ENRIGHT 1996)
1997 ROSENFELD	a geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue, that share specialized infrastructure, labor markets and services, and that are faced with common opportunities and threats (ROSENFELD 1997, p. 8).

Source: own study based on literature cited in Table 1.

- core business,
- support businesses,
- soft infrastructure,
- hard infrastructure (GORYNIA, JANKOWSKA 2008, p. 35).

Cluster attributes

The above definitions of a cluster are only a few examples, since there is not one “correct” and universally applicable definition of the concept. Thus, the present paper focuses on the most common attributes of clusters. Jacobs and De Man distinguished seven key dimensions, essential to describe any cluster:

a) geographical dimension – the spatial concentration/clustering of economic activity;

b) horizontal dimension – horizontal relationship between several competitors in the same or related industry sectors;

c) vertical dimension – vertical relationship between businesses – adjacent phases of the production process, forming a value system;

d) lateral dimension – use of common base such as labor pool, knowledge/skills and resources, sharing different capabilities by different sectors;

e) technological dimension – sharing a basic technology by industries/firms in a cluster;

f) focal dimension – a cluster of firms surrounding a central actor that can be a core enterprise, a research and development center, or an educational institution;

g) quality of network – the way and level of cooperation between firms (JACOBS, DE MAN 1996, pp. 428–429).

Using the above dimensions, Jacobs and de Man demonstrated that clusters may be characterized by a large number of direct competitors, adjacent stages in the production chain, aggregation of connected sectors using common resources and basic technologies, and the impact of the dominant/core organization. The discussed dimensions cannot be identified with different cluster types, but they can be used for cluster classification, thus contributing to the development of a widely accepted definition of a cluster.

Other distinguishing features of clusters have been determined by Meyer-Stamer:

- positive external effects emanating from the existence of a local pool of skilled labor and the attraction of buyers;

- forward and backward linkages between firms inside the cluster;

- intensive information exchange between firms, institutions and individuals in the cluster, which gives rise to a creative milieu;

- joint action geared to creating locational advantages;

- the existence of a diversified institutional infrastructure supporting the specific activities of the cluster;

- a sociocultural identity made up of common values and the embeddedness of local actors in a local milieu which facilitates trust (MEYER-STAMER 1999, p. 1694).

According to Ketels, clusters share four critical characteristics:

- proximity – firms should be located in a close proximity in order to share common resources, and to allow positive spill-overs;

- linkages – the activities of firms need to share a common goal;

- active interactions between firms inside the cluster;

- critical mass – only a significant number of participants has a major impact on the companies' performance (KETELS 2004).

The following characteristics of clusters have been described by Mary Jo Waits:

- business interdependence – businesses relate to each other through the buyer-supplier “food chain” as competitors or as partners;
- export orientation – many of the companies in the cluster sell products and services to companies outside the region;
- concentration – employment in the cluster is more concentrated in the region than is shown by the national average, and the cluster is an existing or emerging area of specialization for the region;
- significant size or rapid growth – the cluster is of a significant size or, if new, has an above-average growth rate, compared to that of the country as a whole (WAITS 2000, p. 42).

In her work, Waits focused on clusters in Arizona and their importance for national economy.

Similar attributes of clusters were described in a report on enterprise clusters and networks, prepared by a group of EU experts in 2002. According to the definition proposed in the report, clusters are groups of independent companies and associated institutions that are:

- collaborating and competing,
- geographically concentrated in one or several regions, even though the cluster may have global extensions,
- specialized in a particular field, linked by common technologies and skills,
- either science-based or traditional,
- either institutionalized (they have a proper cluster manager) or non-institutionalized (*Final report... 2002*, p. 16).

There exists a wide variety of cluster attributes, which results from different approaches to defining a cluster, as mentioned before. Nevertheless, their analysis may provide a basis for a better understanding of the concept, and help determine the key factors of their successful development.

Cluster development in Poland

The idea of clustering has been promoted in Poland since 2002. The number of cluster initiatives has increased significantly in recent years. The experience of Western European countries, where first clusters were established a long time ago, suggests that the many advantages of clusters and networks include an increase in the competitiveness and innovativeness of enterprises and regions, through access to information and new technologies, human capital development, availability of deficient resources and skills due to their complementarity in cluster structures, lowering business-related barriers

and risks, developing flexibility and adaptability skills of enterprises, taking advantage of market opportunities, etc.

An interactive map of clusters, compiled by the Polish Agency for Enterprise Development, shows that there are a total of 147 clusters and cluster initiatives in Poland (Tab. 2), although other sources quote different numbers, i.e. 128 and 122.

Table 2

Number of clusters and cluster initiatives in Poland

Voivodeship	Number of clusters and cluster initiatives
Wielkopolskie	21
Mazowieckie	19
Podlaskie	15
Małopolskie	14
Lubelskie	13
Warmińsko-Mazurskie	12
Podkarpackie	11
Świętokrzyskie	11
Śląskie	11
Kujawsko-Pomorskie	9
Łódzkie	9
Dolnośląskie	7
Pomorskie	6
Zachodniopomorskie	6
Lubuskie	5
Opolskie	3

Source: own work based on Interactive map of clusters and cluster initiatives in Poland <http://www.pi.gov.pl/PARP/data/klastry/index.html> (13.04.2011 r.).

The highest number of clusters and cluster initiatives are located in Lubelskie, Świętokrzyskie and Podkarpackie voivodeships, whereas the lowest in Lubuskie and Opolskie voivodeships.

A study investigating cluster development in Poland was initiated in 2002 by the Gdańsk Institute for Market Economics, in order to identify clusters, determine their potential and chances for cluster structure development in Poland. The first attempt to estimate the development potential of Polish small- and medium-sized clusters was made in the 1990s, while the “Terza Italia” (Third Italy) phenomenon was studied already in the 1970s. Terza Italia is a term used to describe the concentration of firms in selected sectors and regions of Italy, which led to the rapid growth of small- and medium-sized industrial enterprises. Such clusters could enjoy a strong position in the global

market in the segment of traditional, regional products (*Benchmarking...* 2010). Numerous studies have been conducted in Poland over recent years to assess cluster development. Some authors followed a comprehensive approach to clustering, while other focused on clusters situated in selected voivodeships and regions. The first group comprises the following studies:

- Cluster support policy, best practices, recommendations for Poland (BRODZICKI et al. 2004),
- Clusters in the EU-10 new member countries (KETELS, SÖLVELL 2006),
- Cluster development in Poland (HOŁUB-IWAN, MAŁACHOWSKA 2008),
- Clusters in Poland (KOSIŃSKA 2008),
- Proposal for an instrument to optimize knowledge and technology transfer within cluster initiatives (BRODZICKI, TAMOWICZ 2008).

Examples of cluster analyses accounting for the specific character and geographical location of clusters include:

- Development of cluster structures in eastern Poland (*Rozwój...* 2007),
- Strategy for cluster development in the Świętokrzyskie voivodeship (OLESIŃSKI 2008),
- Cluster development in the Lower Silesia region (FABROWSKA et al. 2009),
- Trade clusters in the Kujawsko-Pomorskie voivodeship – an analysis of the printing and electronics sectors (BARON 2008).

An analysis of published source materials revealed that many business initiatives referred to as clusters in fact do not fulfill the definition of clustering and the classical concept of a cluster. The findings of Brodzicki and Tamowicz, who performed a thorough analysis of cluster initiatives in Poland (cited above) to determine the general understanding of a cluster, are not too optimistic. The above authors distinguished three groups of cluster initiatives. The first group comprised undertakings that did not meet the requirements of a cluster initiative. The analyzed projects referred to the idea of clustering, but they had nothing in common with clusters. Such clusters were usually created based on top-down decisions made by municipal bodies and research or educational establishments, poorly rooted in economic reality, mostly for promotional reasons or as part of thematic strategies. As a result, no efforts were made to invest in technology transfer projects or to get funding from the EU structural funds. The second group consisted of undertakings rooted in the business environment, but no concentration of companies in the same of a related sector could be observed. In contrast to the first group, the second-group clusters were characterized by simple forms of innovation transfer, including information exchange, the organization of seminars, training courses and business meetings for all cluster members. Such forms of contact are today most popular among partners within cluster structures. The third group comprised initiatives that most closely resembled the cluster model. They relied on a strong concentration of enterprises, interdependencies

between institutions (machine suppliers, associations, cultural centers), and transfer of innovation (BRODZICKI, TAMOWICZ 2008, pp. 19–20).

An example of a cluster initiative in the third group is the Boiler Cluster established in 2003. Next to the Aviation Valley, this is one of the most dynamically developing clusters in Poland. The Boiler Cluster, which gathers broiler production companies in the Pleszew region, has been co-financed by the EU structural funds. In 2008, the cluster registered the “Innovative Pleszew Boiler” trademark. Cluster members carry on joint advertising and marketing campaigns to strengthen the cluster’s market position, and they cooperate with research and development centers. As part of its innovation strategy, the cluster has applied for two patents, “Methodology and a boiler for controlled fuel combustion” and “Heating device housing”, and it has developed an innovative product, “RetCluster25 Premium Boiler”. Efforts have also been made to establish the Research and Development Center of the Boiler Cluster and to prepare cluster participants for entering into a partnership with research and development institutions (KUBERKA 2010).

Clusters in Poland have been analyzed and mapped by the European Cluster Observatory (ECO). The strength of regional clusters was evaluated with the use of the following three parameters in respect of which one, two or three stars were awarded to each cluster: cluster size, cluster specialization, and employment concentration. The above factors indicated whether the cluster reached critical mass. The attainment of critical mass determined the achievement of economic results that supported the growth of the region and industries in a given cluster category. A total of 147 clusters were identified, of which 10 were awarded three stars, 39 received two stars, and as many as 98 only one star (ROMANIUK 2011). The obtained results show that the cluster potential in Poland is generally average or low.

A recent study of cluster development in Poland, conducted in 2010, covered 47 clusters that agreed to participate in the survey. Most of them were located in the Małopolskie voivodeship, and the fewest were situated in the Kujawsko-Pomorskie, Lubuskie, Opolskie, Świętokrzyskie and Warmińsko-Mazurskie voivodeships. The vast majority of the analyzed clusters were established three to four years ago as grassroots undertakings in the form of associations. Enterprises dominate among cluster participants (79%), and most clusters are still at the embryonic stage of development (53%). The majority of the investigated clusters have their development strategies, although many of them have not been formalized yet. The most common goals of cluster organizations are to promote and support their respective sectors, to detect new project opportunities with the use of investment funds and through cooperation with cluster partners (e.g. offering common services), to exchange knowledge and experience as part of collaboration between enterprises and research and development centers (*Benchmarking...* 2010).

An analysis of data available at the “Portal Innowacji” website and relevant professional literature shows that the formation and development of clusters in Poland are limited by a number of factors, including administrative, legislative, technological and cultural barriers, primarily fear of entering into cooperation which results from mistrust towards firms, institutions and potential cooperators. Strong economic and business ties have not yet been developed in Poland, while trust between competitors and the realization of common goals lie at the core of the cluster concept. A comprehensive cluster-based policy is needed to support cluster creation and development. In Poland, first clusters were established in 2004–2006, when the EU structural funds were made available through measure 2.6, Regional Innovation Strategies and Transfer of Knowledge, within the framework of the Integrated Regional Development Operational Program. Some of the clusters have survived until today, while the activity of other was suspended or limited with the end of funding. In 2007, the Polish Agency for Enterprise Development implemented a pilot program, Support for Cluster Development. Another interesting initiative was the implementation of a cluster support program, Innovation Express, promoting international cooperation in the field of research, development and innovation. The INNET project (networking of national/regional funding and innovation organizations for the involvement of SMEs in technology-based innovation clusters in Europe), financed from the funds of the Sixth Framework Program, focused on identifying mature cluster structures, followed by designing and implementing the First Pilot Program (Pilot Call) in selected clusters. The Polish Agency for Enterprise Development invited cluster coordinators from eastern Poland to apply for EU funding. The prerequisite for program participation was conducting business activity within a cluster by at least five enterprises, one research establishment and one business entity promoting economic development or innovation. The deadline for submitting applications was the end of April 2011, and the total budget was over PLN 15 mln (KOŁTUNIAK 2011).

In Poland, cluster development is stimulated with the involvement of innovation policy instruments, and actively supported from EU structural funds. One of them is the Innovative Economy Operational Program for 2007–2013 and measure 5.1, Support for Cooperative Connections of Supra-regional Importance. It should also be noted that some specialists share the opinion that clusters are sometimes established merely to get funding from the EU structural funds, that their members do not really intend to cooperate or formulate common goals and strategies, and that they do not believe in the benefits of clustering. If this opinion proved true, EU funds should be allocated based on more restrictive criteria, as part of a comprehensive national policy supporting the development of clusters and cluster initiatives in Poland.

Summary and Conclusions

The clusters' operating time in Poland is relatively short, which is why the majority of them are still at the embryonic stage of development. This is the first step towards mature structures. The European Commission has recognized clusters as important settings for enhancing competitiveness and innovation in the European Union member states. Initiatives to support cluster creation and development are nowadays widespread in Europe. The European Cluster Observatory has compiled a cluster policy map in Europe. A total of 130 cluster support instruments have been identified in 31 countries, yet the cluster support mechanisms in Poland are insufficient. Most of them rely on the EU structural funds which in the future will be increasingly allocated to international cluster organizations rather than individual initiatives. The European Union aims to increase critical mass through cross-border economic cooperation, which may slow down cluster development in Poland, or lead to cluster polarization and a decrease in the number of new cluster initiatives.

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