

Clusters – the concept and Polish experiences

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The first economic clusters appeared more than 200 years ago when classical economists noted that businesses are spread unevenly and concentrated in certain geographical areas. Even today, concentration of competing and collaborating businesses is something that differentiates geographical regions. However, it was M. Porter who coined the term cluster in 1990 when he presented his new theory on business operations. As defined by Porter, a cluster is 'a group of interrelated enterprises located in a certain geographical area, comprising specialized suppliers and service providers operating in related sectors of economy as well as linked institutions like universities, standardization institutions, and trade associations. In certain areas they compete, while in others cluster participants collaborate closely.

In recent years in most Western countries an immense amount of research has been undertaken both to identify existing clusters and analyze factors that stimulate and restrain the development of clusters. For instance, in the United States alone, nearly 380 clusters operating in all sectors have been analyzed. In Europe, clusters have aroused especially intense interest in Great Britain, Germany and France. Based on rich analytical resources many regions and cities have developed their own development policies to support and promote clusters. The European Commission and the Organization for Economic Co-operation and Development have also undertaken important initiatives to propagate the idea of clusters.

What emerges quite clearly from the review of available literature is that there is no standard definition of clusters. Most of definitions use the following basic factors to define a cluster:

[1] *Geographical (spatial) concentration.* Proximity is conducive to the dissemination of innovations and the development of co-operation as well as to establishing and maintaining contacts between partners.

[2] *Co-operation (competition).* Co-operation and competition, frequently analyzed jointly, trigger a synergy effect that increases benefits for the cluster's participants and strengthens their innovative potential.

[3] *Sectoral concentration.* Cluster's participants operate in the same or related sectors.

[4] *Specialization.* One of the traits of many

clusters is the existence of specialized companies and organizations. Both economic theories and empirical research show clearly that specialization improves the efficiency of organizations and strengthens the need for co-operation and establishment of co-operational links.

[5] *Interdependence.* The cluster participants interact and the quality and intensity of these interactions are crucial to achieving economic success by a cluster.

Porter was right to define a cluster as a geographical concentration of interrelated companies, specialized suppliers, service providers, and businesses operating in similar sectors as well as related institutions (like universities, normalization organizations and institutes as well as branch associations). It is also true that in certain fields these organizations may collaborate and compete. In our view Porter's definition should be completed by one indispensable element – a leadership. To become established and then develop every cluster needs a leader that initiates and coordinates co-operation between cluster participants and other market players. Leaders can be natural persons, big enterprises, resilient research-and-development centers, or scientific institutions as well as government and self-government bodies. Since in many cases the clusters are informal organizational structures, charismatic leaders with clear vision are crucial for the clustering process to be successful and effective.

The more effective and diversified the coop-

eration between companies, even between competitors, the more innovative and competitive they will be. The concept of clusters does not reject competition; it rather seeks to balance co-operation and competition. This state of equilibrium is described by a specially coined term *co-opetition*. In most of modern business theories competition is seen as one of the key forces that drive innovation. Innovation, however, would not happen without broadly understood human and social capital. Geographical proximity facilitates frequent formal and informal direct interpersonal contacts, which are conducive to the effective transfer of knowledge within the local systems of innovation and clusters. Cluster participants establish a system of interactions and interdependence that generates synergy contributing to the economic growth of companies and development of regional and national economies.

In England Marshall, having analyzed the willingness of companies in the production sectors to locate business near their competitors, major suppliers and customers, developed a concept of external economies of scale. In this way he specified all factors conducive to the improvement of operational efficiency existing in the immediate environment. Marshall identified three main reasons why companies choose to locate their business in the vicinity of other companies operating in the same sector of the economy:

- [1] emergence of a market of specialized vendors and customers;
- [2] local labor markets that offer experienced and highly qualified work force;
- [3] diffusion of knowledge (knowledge spill-over) between companies; the concentration of production in industrial districts allows companies (especially small and medium-sized companies) to specialize, exploit joint infrastructure and mimic the best technological and organizational solutions used by competitors.

Specialization and diffusion of knowledge inside clusters allow cluster participants to reduce their costs, improve quality and increase demand for products and services offered by clusters. The following are the main

factors leading to the establishment of clusters:

- [1] Historical background and conditions, tradition, and resulting experience in a certain field (repository of tradition).
- [2] Access to various resources, including natural resources, energy and raw materials, human capital, workforce (skilled and unskilled), knowledge (especially tacit knowledge), and the like.
- [3] Access to research-and-development facilities, scientific institutions and highly qualified personnel, which is of the highest importance, in particular for high-tech industries.
- [4] Other conditions specific for a given sector of industry, for example proximity to rivers and other water routes that facilitate cheaper transport of manufactured products or establishment of hydroelectric power stations, etc.
- [5] Proximity to markets, customers, and low costs of entry into the markets.

As stated earlier, there is no standard and commonly accepted definition of clusters. Likewise, there are no standard criteria that could be used to determine whether in a given area a cluster exists or not. However, it seems that clusters should fulfill the following basic conditions – there should be a geographical concentration of companies operating in related sectors, such companies should interact in two ways – they should co-operate and compete. Co-existence of these two forms of interaction of companies in a given area is necessary to produce a synergy effect. Competition among these companies stimulates innovation and changes inside companies. The question of how this synergy effect could be measured still remains open. Basic characteristics of clusters include the following elements:

- [1] Co-operation in the cluster is focused on a specific venture. Entering the cluster is nothing more than a simple declaration of co-operation in the future. Specific obligations of partners result from further agreements concluded on a project-by-project basis and calculations of the project's profitability. There are no imposed strict regulations in

this matter, unlike in case of groups of producers.

[2] In clusters the distribution of profits is based on real engagement in the project or venture. In companies and partnerships profits (dividend) are distributed according to the shares owned in the company by particular stakeholders.

[3] The lack of formal management bodies. Large corporations usually have developed costly administration and bureaucracy. In clusters management is entrusted to a selected project (business venture) coordinator who assumes full responsibility for effective project/venture management.

[4] The lack of joint capital. Partners entering the capital companies and contributing assets to a company lose, in a sense, their full proprietary sovereignty (at least regarding assets brought into the company). In case of farms this is the main obstacle and something of a psychological barrier preventing farmers from undertaking joint business ventures.

[5] Joint system of settlement of accounts. However, individual responsibility of each of the cluster's participants is maintained. Clusters should have at least the status of an imperfect artificial person, and they should have legal capacity. In order to improve management and administration, cluster participants sometimes entrust certain activities, like accounting and book-keeping, to external companies. However, they can choose to have these activities performed by the cluster itself. Clusters serving as sort of accounting centers provide managerial accounting and book-keeping, and produce tax declarations as well as serve as an information exchange center or even represent cluster participants in dealings with external partners.

One could identify the following model-cluster-formation stages:

[1] Emergence of pioneering companies, often exploiting available local knowledge, and first spin-off companies.

[2] Emergence of specialized suppliers, service providers and formation of a qualified workforce market.

[3] Formation of new organizations delivering services to companies operating in the

cluster.

[4] Attraction and inflow of other companies and qualified personnel, which form a base for setting up new companies.

[5] Formation of non-market (informal) relations between the cluster's participants, which stimulate and expedite further inflow of knowledge and information.

[6] Collapse of the cluster due to its fossilized structure, inadaptability and inability to introduce changes.

Regional cluster initiatives in Poland

The recent report on economic clustering published by the Organization for Economic Co-operation and Development (OECD) states that although there is a huge potential for economic clustering in Poland, clusters do not in reality exist in the Polish economy. It should be admitted that in recent years very little has been done to promote and stimulate such initiatives. Poland's interest in the promotion of clusters is a quite recent matter.

However, from 2005 on more than 50 cluster initiatives have emerged in Poland. Today, some of them are recognized as clusters.

There are clear indications that clustering processes occur in almost all Polish regions. Sectors in which already identified clusters operate result from regional specificity.

For instance, clusters emerging in the rural Lublin region operate in horticulture, fruit-growing, truck farming, hop growing, cattle breeding and dairy farming. Here clusters group agricultural products producers, food processing companies, certification organizations, universities, forwarders and agricultural consulting centers.

Ecological Food Valley (Dolina Ekologicznej Żywności) is the most recent cluster project pursued in the Lublin region.

In western Poland, Wielkopolskie region in the other region rich in cluster initiatives – furniture joinery cluster, automobile cluster, clusters *Bryczki z Biskupizny* and *Kotły pleszewskie*, to mention just a few.

In Western Pomorania region located at the Baltic Sea operate *Fish Processing Groups* and *JCT Pomorania Klaster*.

Świętokrzyskie region has building and ceramic clusters, while in Silesian region in the stage of organization are three clusters – *Innowacyjny Śląski Klaster Czystych Technologii (Silesian Innovative Cluster of Clean Technologies)*, *Klaster Techniki i Aparatury Medycznej (Medical Technologies and Apparatus Cluster)*, and *Klaster Transportu Szynowego (Rail Transport Cluster)*.

Moreover, in all 16 Polish regions there are attempts to establish tourist clusters building on regional tourist and environmental attrac-

tions.

Tourist companies perceive joint marketing, better promotion of their regions and exchange of expertise and experience as a key to their success and development of regions they operate in.

As mentioned above, in the year following the OECD report a number of clusters were initiated. The following table presents both existing and projected economic clusters in particular regions of Poland.

Table 1. Planned and existing economic clusters in Poland

	Cluster's name	Region	Source of information
1	Ceramika Bole-slawiecka	Lower Silesia (Dolnoslaskie voivodship)	URL: http://klastry-efs.pl
2	Granit Strzegomski	Lower Silesia (Dolnoslaskie voivodship)	URL: http://klastry-efs.pl
3	Brokuły-Kalafior	Lubelskie voivodship	URL: http://klastry-efs.pl
4	Chmielaki Nadwiś-lańskie	Lubelskie voivodship	URL: http://klastry-efs.pl
5	Dolina Ekologicznej Żywności	Lubelskie voivodship	URL: www.dolinaeko.lublin.pl/
6	Epoka Gryczoka!	Lubelskie voivodship	URL: http://klastry-efs.pl
7	Klaster Branży Lotniczej in Świdnik (in conception development stage)	Lubelskie voivodship	Information provided by Regional Industrial Park (Regionalny Park Przemysłowy) in Świdnik
8	Klaster turystyczny Chełm	Lubelskie voivodship	URL: http://klastry-efs.pl
9	Owoce miękkie	Lubelskie voivodship	URL: http://klastry-efs.pl
10	Dolina Lotnicza	Lubelskie voivodship Podkarpackie voivodship Silesia voivodship (Slaskie voivodship)	URL: http://dolinalotnicza.pl
11	Zdrowie poprzez ruch	Lubuskie voivodship	Regional Strategy of Innovation (RSI) of Lubuskie voivodship
12	Klaster Łódzki	Lodzkie voivodship	URL: http://www.klasterlodzki.pl
13	Plastikowa Dolina	Malopolskie voivodship	URL: http://www.tkp.com.pl
14	Dolina Ekoprodukcji	Mazowieckie voivodship	URL: http://klastry-efs.pl
15	Klaster Poligraficzny in Warsaw	Mazowieckie voivodship	Szultka S. „Klastry. Innowacyjne wyzwanie dla Polski”, IbnGR, Gdansk 2004.
16	Food-processing cluster	Podkarpackie voivodship	URL: http://www.ig.wsiz.edu.pl/grona/
17	Klaster Przemysłowy – Stowarzyszenie Producentów Komponentów Odlewniczych „KOM-CAST”	Podkarpackie, Lubelskie, and Świętokrzyskie voivodships	URL: www.pi.gov.pl
18	Podkarpackie Region IT cluster	Podkarpackie voivodship	URL: http://pki.klastry.org/
19	Grupa drzewna	Podlaskie voivodship	URL: http://klastry-efs.pl

	Cluster's name	Region	Source of information
20	Grupa mleczarska	Podlaskie voivodship	URL: http://klastry-efs.pl
21	Grupa maszynowo-mechaniczna	Podlaskie and Warminsko-Mazurskie voivodships	URL: http://klastry-efs.pl
22	Grupa turystyczna „Leba”	Pomerania (Pomorskie voivodship)	URL: http://klastry-efs.pl
23	Grupa Bursztynowa	Pomerania (Pomorskie voivodship) and Western Pomerania (Zachodniopomorskie voivodship)	URL: http://klastry-efs.pl
24	Beskidzki Klaster Turystyczny	Silesia (Slaskie voivodship)	Information provided by the Silesian University of Technology
25	Innowacyjny Śląski Klaster Czystych Technologii Węglowych	Silesia (Slaskie voivodship)	URL: www.silesia-region.pl
26	Klaster Techniki i Aparatury Medycznej	Silesia (Slaskie voivodship)	Information provided by the Silesian University of Technology
27	Klaster Transportu Szynowego	Silesia (Slaskie voivodship)	URL: www.silesia-region.pl
28	Grono budowlane	Swietokrzyskie voivodship	Organizacja i Kierowanie, Vol. 3(109), 2002.
29	Pomidor z Ziemi Sandomierskiej	Swietokrzyskie voivodship	URL: http://klastry-efs.pl
30	Grono ceramiczne	Swietokrzyskie, Mazowieckie and Lodzkie voivodships	URL: http://klastry-efs.pl
31	Klaster producentów jachtów	Warminsko-Mazurskie voivodship	URL: http://klastry-efs.pl
32	Grupa meblarska	Warminsko-Mazurskie voivodship	URL: http://klastry-efs.pl
33	Klaster Bryczki z Biskupizny	Wielkopolskie voivodship	URL: http://klastry-efs.pl
34	Klaster meblarski	Wielkopolskie voivodship	URL: http://klastry-efs.pl
35	Klaster motoryzacyjny	Wielkopolskie voivodship	URL: http://www.warp.org.pl
36	Klaster przetwórstwa spożywczego (in conception development stage)	Wielkopolskie voivodship	URL: http://www.warp.org.pl
37	Kotły pleszewskie	Wielkopolskie voivodship	URL: http://klastry-efs.pl
38	Rogal Marcinski	Wielkopolskie voivodship	URL: http://klastry-efs.pl
39	Grupa przetwórstwa rybnego	Western Pomerania (Zachodniopomorskie voivodship)	URL: http://klastry-efs.pl
40	Klaster Automatyki Przemysłowej in Gdansk	Western Pomerania (Zachodniopomorskie voivodship)	Szultka S. Klastry. Innowacyjne wyzwanie dla Polski, IbnGR, Gdańsk 2004.
41	Klaster turystyczny	Western Pomerania (Zachodniopomorskie voivodship)	URL: http://www.um-zachodniopomorskie.pl
42	Klaster morski	Western Pomerania (Zachodniopomorskie voivodship)	URL: http://www.kigm.pl
43	ICT Pomerania Klaster Informatyczny	Western Pomerania (Zachodniopomorskie voivodship)	URL: www.ictpomerania.pl

Source: Information collected by the authors (data revised as of early March, 2006).

What was the reason that merely a year after publication of the aforementioned OECD report in almost all of the Poland's regions (ex-

cept for Opolskie voivodship) work on at least one cluster project was initiated? It is beyond any doubt that the popularity of the

concept of clusters, networks, and innovation systems is growing amongst employees, scholars and politicians. Moreover, Poland's membership in the European Union has also played a significant role. Upon accession Poland gained access to funds made available by the European Union to support innovative initiatives in member states. The very fact that every region in Poland has developed a Regional Strategy of Innovation (RSI) translates directly to a number of initiated cluster projects.

Main advantages and disadvantages of clusters

There is quite unusual agreement of opinion concerning the potential benefits of clusters for local, regional and national economies. Effective clusters having access to relatively cheap means of production and other resources contribute to the increase in productivity of local businesses (Mariussen 2001). Secondly, the spatial proximity of businesses stimulates and supports their innovativeness (Marshall 1925, OECD 2000). And thirdly, developing clusters stimulate the formation of new businesses, which translates into new jobs (Sternberg 2001). Effective clusters stimulate investments in the development of infrastructure, development of specialized business-supporting services and contribute to an increase in personal earnings. Therefore, clusters can drive regional development (Austin, Cambridge, Penang) Advanced technologies spill over to other sectors of the local and regional economy, and thus clusters contribute to the improvement in international competitiveness of local and regional economies.

Numerous studies commissioned by OECD and the European Union have proved that clusters contribute significantly to an increase in the competitive advantage of regions. Clusters are considered to be stimulators of regional development. They stimulate exports and attract foreign investments. Cooperation among companies grouped in clusters allows them to achieve a synergy effect and thus improves their efficiency and competitiveness on the market. Moreover, the so-

cial effects of clusters include the reduction of unemployment and stimulation of the development of local democracy. Among the many factors that stimulate the development of clusters are the following:

[1] *Widening of the range of products and services.* It is a well-known fact that clusters attract other businesses; thus there are new companies established in clusters and many companies operating in related sectors migrate from other areas. Providers of specialized services and vendors delivering raw materials, parts and production components, facing increased competition in the cluster, are forced to reduce their prices and improve the quality of delivered products. Companies operating in the cluster have lower transportation costs. Therefore, final products manufactured can be offered at cheaper prices.

[2] *Increased interactions between a cluster's participants.* Geographical concentration of businesses involved in related sectors results in the development of interactions between these companies. Clusters offer numerous opportunities to establish cooperation, emulate others, and to forge various business alliances. This is why clusters can be such effective production systems. Companies functioning in clusters can use available resources and means of production more effectively and efficiently. They can jointly develop new products and technologies, as well as combine their resources when investments in specialized and costly infrastructure are needed. A cluster's participants can collaborate and organize joint distribution channels and procurement systems. Finally, they can lobby for their interests and jointly market their products on international markets.

[3] *Greater specialization.* The concentration of many collaborating businesses operating in related sectors is the cause and result of progressive vertical deconcentration of the production process (progressive specialization). The existence of many businesses in a given area facilitates outsourcing, a significant reduction of transactional costs (i.e. negotiation costs, costs associated with the acquisition of new customers) and specializa-

tion. The presence of many businesses operating in the same sector is a result of the vertical disintegration of production process. Huge markets mean that products are manufactured in larger series which makes production more viable.

[4] *Lower transactional costs.* The formation of social capital (i.e. increased confidence between partners) in a given area resulting from frequent formal and informal contacts maintained inside the cluster, both at management and employee level, leads to a reduction in transactional costs. Increased confidence enables knowledge sharing and facilitates faster exchange of information between partners.

[5] *Diminished uncertainty.* Co-operation between companies and other organizations operating in a cluster diminish their sense of uncertainty regarding directions of future technological development of their products and market demand. Concentration of co-operating businesses developing new products and technologies facilitate work on many projects, increasing significantly the likelihood of market success.

All the above-mentioned factors improve the flow of knowledge and information between companies and organizations in the cluster. They also contribute to significant reduction in transactional costs, which would not be possible without a boost in confidence between partners. Specialization in the clusters increases efficiency and productivity. Benefits resulting from effective clusters are not limited to the cluster itself. Clusters generate a lot of positive effects for the regions they operate in. Clusters stimulate innovation and are conducive to the formation of new businesses, mainly small and medium-sized enterprises. Clusters encourage internal co-operation and create conditions in which organizations operating in the clusters can more easily improve their competitive advantage. Moreover, clusters exert a very positive impact on labor-market development and the generation of new jobs. Finally, operation in clusters stimulates the pro-export orientation of companies, increases their profitability and thus contributes to economic develop-

ment as well as to shaping and then maintaining competitive advantage.

Clusters can also trigger negative effects, which in some cases outweigh the advantages. It is frequently noticed that clusters can lead to excessive concentration of population and business activities in a certain geographical area (so-called congestion effect). Excessive concentration carries the risk of congestion and the pollution of existing infrastructure. Therefore, in the long run social costs resulting from clusters' operations can even outweigh social benefits.

Moreover, concentration of businesses usually leads to a significant surge in land and real estate rental charges. Labor costs grow in clusters where labor force resources are limited. This has negative impact on price competitiveness.

The size of a cluster and resultant scale of production threaten the effective coordination and management of the cluster and disrupt the flow of information and decision-making process.

The lack of uniform research methodology on clusters and clustering processes is one of the reasons that voices questioning the benefits associated with clusters and clustering, especially those involving the potential influence of clusters on the competitive advantage of companies and regions, have increased in recent years (Boosling Innovation: The Cluster Approach, OECD, Paris 1999, p. 270).

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