

# "The key" to a successful cluster development – a case study from the Czech Republic and Poland

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## ABSTRACT

The aim of this paper is to define factors influencing formation and development of clusters in the Czech Republic and Poland. The authors describe the existing cluster-based policies and the stages of a cluster development in these countries. On the basis of the case studies of clusters such as Envicrack from the Czech Republic and the Aviation Valley from Poland, the authors try to define key factors and recommend activities essential to a successful cluster development in other emerging clusters.

## KEYWORDS

Cluster, cluster-based policy, successful development, Czech Republic, Poland

## Introduction

Being competitive in today's globalized market poses a challenge for entrepreneurs. Individual entities start to see the opportunity for further development in networks of cooperation. Clusters as a structure appear as a good combination of collaboration and competition, where participating entities have the possibility to join their efforts and resources in order to achieve competitive advantage over others. Clusters are becoming a modern way of cooperation of both profit and non-profit organizations. Successful clusters enhance the efficiency of individual companies and drive the economic development in many countries.

The literature lays out various definitions of the *cluster* concept, including the terms *industrial cluster*, *regional cluster* or *innovation cluster*. The M. E. Porter (1990) description seems to reflect most accurately what the cluster is. Porter (1990) defines a cluster as "a geographic concentration of mutually interconnected companies, specialized suppliers, providers of services, companies in similar fields and associated institutions, such as universities, agencies and associations of different orientations, which compete, but also cooperate."

It is also very common that the formation of clusters and support of their development are connected with the so-called *cluster initiative*. The cluster initiative, according to the Green-

book of Cluster Initiatives (2006) is defined as "an organized effort focused on the increase of growth and competitiveness of a cluster in the region with the participation of cluster companies, government and/or research community".

Now then, cluster consolidates the world of industry, science and education giving the opportunity to exchange knowledge, combine financial and human capital, assets, technologies and ideas into the development of one "organism". It is characterized by a geographic concentration of companies in relatively closely related fields (branch specialization), which cooperate and share mutual needs (are complementary to one another). Each cluster is different and poses its own strategy of activity, management and financing. Nevertheless, the questions arise: are there any conditions that the cluster has to fulfill in order to become successful? Is there any "key" to success? While searching for these answers, it is important to take a good look both at the background and cluster-based policy of the country in which the cluster operates, and the experience of clusters, which are already considered as successful.

The aim of this paper is to present the conditions influencing formation and development of clusters in the Czech Republic and Poland. The authors introduce the background in regards to cluster-based policies and the stage of cluster development in those countries. Additionally, on the basis of the best practices of clusters including Envicrack from the Czech Republic and the Aviation Valley from Poland, an attempt to define factors influencing a successful cluster development will be undertaken.

## Cluster-based policy

Clusters have become the focal point of many new policy initiatives in the last few years, in Europe as well as elsewhere around the globe. Public institutions purposely support the formation and development of clusters and consider them as a tool for stimulating an increase of competitiveness and attractiveness of particular regions.

Clusters and cluster initiatives are in a number of countries supported by governmental and regional institutions mainly in the following form:

- Informational support and education by means of “Guides”, seminars, and conferences,
- Grants supporting mapping of potential clusters (which can be created at regional, supra-regional or cross-border levels),
- Grants supporting the implementation of selected projects.
- Individual countries and regions have different approaches to founding clusters and supporting their development. The support may be enabled in direct form e.g. from the European Union funds or in indirect one as support through Technological Parks, Venture Capital funds etc.
- Different instruments conducting support of cluster establishment and development may be distinguished:
- In the form of contests offering financial support for cluster establishment – oriented on promoting clusters,
- In the form of supporting mechanisms stimulating cluster development – infrastructure development, support through Technological and Industrial Parks,
- In the form of indirect policy creating favorable conditions for cluster development – support of research connected with the area of cluster activity but held at the universities (Baranowska, Skrok, 2009).

Within the European Union (EU), appeared different initiatives realized within the time frame 2006-2009, such as BSR InnoNET – the Baltic Sea Region Innovation Network, CE-E-ClusterNetwork – Central and Eastern European Cluster and Network Area, and INNET – Networking of national/regional funding and innovation organizations for the involvement of SMEs in technology-based innovation clusters in Europe, which highlighted the importance of networking and cluster development (Ministerstwo Gospodarki, 2006).

Due to the EU cohesion policy oriented on stimulating competitiveness and innovativeness among others based on a cluster concept, cluster development became an object of interest in the Czech Republic and Poland. Cluster-based policies in those countries started to develop on a similar basis, however, with different steps undertaken.

### The policy in the Czech Republic

In the Czech Republic, the first activities directed towards clusters support started to develop in 2003. In July 2005, the National Cluster Strategy for the years 2005-2008 (Národní klastrová strategie na období 2005-2008) was elaborated as a main document in the clusters area. It contained the main principles, measures and aims of application of a successful economic model of a cluster in regards to the conditions existing in the Czech Republic.

The aim of the Strategy was to identify key entrepreneurial clusters, which would be supported from limited governmental funds. It was directed to those clusters which had a potential to generate good quality jobs and thus positively influence employment, and which would be able to influence an increase of company's performance and in turn lead to higher competitiveness and innovation. A targeted public support for those clusters was oriented on the development

of professional education, job creation, information and telecommunication technologies, investments, innovations, creation of transport and logistics infrastructure etc. For the realization of the National Cluster Strategy in 2005, the amount of 36 mil. CZK was budgeted, where 27 mil. CZK was secured by the Structural Funds of EU and 9 mil. CZK by the government of the Czech Republic. For the years 2006 and 2007, the amount of funding planned amounted to 120 mil. CZK per year and for 2008 – 140 mil. CZK. In this way, the Czech Republic joined countries, which supported formation and development of clusters in their financial schemas.

The most important component of financing clusters from public sources in the Czech Republic provides structural funds of the EU. Within these funds in the time frame 2004-2006 the Operational Program Industry and Enterprise (OPIE) (Operační program Průmysl a podnikání – OPPI), programme Clusters (Klastry) was realized. It was the first program explicitly addressed towards clusters development in the Czech Republic ([www.czechinvest.org](http://www.czechinvest.org)). The patronage on it was wielded by the Investment and Business Development Agency – CzechInvest under the Ministry of Industry and Trade. The program priorities were divided into two phrases:

1. Seeking out and identifying enterprises open for cooperation and preparation for potential cluster creation,
2. Cluster establishment and further development – financing business and activities of cluster initiative throughout three years long period.

First “mapping” part of the program conducted to identification of existing potential within particular industry or branch, mainly the linkages among companies but also between companies and other institutions e.g. universities. Within further cluster development, the support was directed into common cooperation on joint projects in the area of: research and development, purchasing and selling, joint promotion, recognition on the market and competitiveness, improvement of employees' qualifications, development of cooperation with research and tertiary education institutions etc.

At present, Programme OPIE Clusters is followed by the Operational Programme Enterprise and Innovation 2007-2013 – OPEI COOPERATION (Operační program Podnikání a inovace – OPPI, Spolupráce) with its focus on supporting formation and development of cooperation groups – clusters and technological platforms. The current aim of the program is to create a favorable entrepreneurial environment, improve conditions for enterprising and innovation, and develop a competitive advantage, thanks to the improvement of linkages among research, education and entrepreneurial spheres. In October 2008, the first call for clusters with allocation of 1 mld. CZK (accepting applications till December 2009) was announced. In February 2010, a second call with allocation of 750 mil. CZK and application period till the end of September was advertised. Within supported activities, common cluster projects in the area of technical infrastructure with innovative character, in the area of innovation, cluster promotion, human resources and networking,

sharing know-how and capacity can be highlighted. The new program (compare to the previous one) was broadened. It is for example less restricted in regards to the industry sphere. So called “cluster mapping” is not implemented and a cluster formalization is not primarily limited to the company membership from a certain region and/or maximum of two adjacent regions. Nevertheless, other regulations such as the fact that a cluster has to have minimum of 15 independent members, at least 60% of cluster members have to be Small and Medium Enterprises (SMEs) and a tertiary education institution (university) or research institute has to participate in a cluster, were maintained. A novelty is that buying e.g. a real estate or a land belongs towards eligible costs of a project. Within these calls clusters may apply for support amounting 3-80 mil. CZK. Detail information about the program is available on the websites of the Ministry of Industry and Trade and the CzechInvest Agency.

In addition to that, other strategic documents such as the National Innovation Policy of the Czech Republic for the years 2005-2010, the Strategy of Regional Development in the Czech Republic for the years 2007-2013 or the National Strategic Reference Framework of the Czech Republic 2007-2013 play a supportive role in the cluster development.

Clusters are an object of support within documents devoted to realizing the European Union (EU) coherence policy – within the EU structural funds for the years 2007-2013. The policy towards clusters and cluster initiatives is being realized not only on the national but also on the regional government level (within Regional Operational Programs – Regionální operační programy, and regional innovation strategies).

### The policy in Poland

In Poland, the cluster-based policy was introduced in 2002 when the research on industrial clusters in the new member states was done by the European Commission. Further attention to cluster concept started to be paid in 2004 when an effort to identify and map out potential clusters was undertaken for the first time in Poland. In 2005, *Training Program on Clustering* and in 2007 the Pilot Project: *Support for Clusters* both based on the EU Structural Funds were provided by the Polish Agency for Entrepreneurial Development PAED (Polską Agencję Rozwoju Przedsiębiorczości – PARP) government agency subordinate to the Ministry of Economy, in order to promote cluster development and expand national and international cooperation. *Training Program on Clustering* embraced a two year time frame from October 2005 till the end of 2007 and was budgeted on 5,76 mil. PLN co-financed from the European Union Social Fund and government sources (Kosińska, 2007). *Support for Clusters* was financed by the state budget and offered a support of 2 mil. PLN, where the amount of financial support for a cluster could not be less than 150 thousand PLN and also not more than 550 thousand PLN (support could not exceed 95% of aggravated expenditures, further 5% had to be covered by the applicant). The possible time for application was from August till September 2007, and the financial settlement had to be done

till the end of November 2007. Only the cluster coordinator could apply for financial support. Additional further requirements had to be fulfilled such as: legal form of coordinator who had to have the domicile on the territory of Poland; coordinator had to operate non-profit or allocate profit for activities realized by PAED; had to possess experience in cluster management and service providing for cluster participants; and should also dispose with appropriate human resources ([www.parp.gov.pl](http://www.parp.gov.pl)).

On the regional level, the most important tool of support was Zintegrowany Program Operacyjny Rozwoju Regionalnego ZPORR 2004-2006 (the Integrated Regional Operational Programme, further “IROP”) with its aim to increase a regional innovativeness through the development of cooperation (transfer of knowledge and innovation) among R&D and private sectors.

Furthermore, within the time frame of 2006-2009, appeared other initiatives realized in the EU policy level where among others was INNET. Within INNET the Innovation Express (IE) – joint call for proposals supported by the national/regional agencies and authorities was introduced in 2008. Its main goal was to support activities, which “initiate, develop and enhance technological co-operation between the European clusters for the prime benefit of their SME members” ([www.proinno-europe.eu](http://www.proinno-europe.eu)). Within IE, a special “matching tool” was developed with an objective to give clusters an opportunity to find potential partners for future trans-national cooperation. Program’s budget accounted for 3,15 mil. PLN ([www.parp.gov.pl](http://www.parp.gov.pl)).

In connection with gradually accrued interest in networking and cooperation, new national strategies and programs had to include clusters’ concept within their priorities. Therefore, currently realized Operational Program Innovative Economy OP IE (Program Operacyjny Innowacyjna Gospodarka – PO IG) for the years 2007-2013 contains specified priority “Diffusion of Innovation” oriented on development of co-operational connections (networking) and common investments of groups of entrepreneurs. The budget of an OP IE 2007-2013 composed 9,7 mld EUR where 8,3 mld EUR comes from the European Regional Development Fund (further “ERDF”) and the rest from the state budget. The priority 5.1 itself allocates 398,99 mil. EUR. Cluster coordinator is the one who can apply for financial support within OP IE program; however, it has to meet specified conditions such as:

- 1) Cluster coordinator: an association, foundation, limited liability company, joint-stock company or R&D entity,
- 2) It has to pose domicile on the Polish territory,
- 3) Operates non-profit or allocate the profit for activities realized by PAED,
- 4) Possess at least yearly experience in managing the cluster/ cluster initiative (it can be an experience gained within management of informal cluster structure) and accomplishment of services in aid of entities which entered the cluster,
- 5) Employ the employees possessing necessary qualifications,
- 6) Assure equal access to all entities functioning within cluster such as services, traineeships, materials, intangible

- assets, tangible assets and equipment acquired within the project, for payment non-excluding costs bear by coordinator in regards to their maintaining or accessibility,
- 7) Preserve the durability of an investment through minimum five years.

Furthermore, Operational Programme Development of Eastern Poland OP DEP for the years 2007-2013 (Program Operacyjny Rozwój Polski Wschodniej) with its Priority axis I Modern Economy and Activity 1.4 Promotion and Cooperation is aimed on cluster concept as well (Operational Programme Development of Eastern Poland 2007 – 2013).

Financial support for clusters also appeared with the Pilot program for the years 2008-2010 *Bonds for innovation* (Bon na innowacje) whose main idea is to initiate contacts among micro and small enterprises and research institutions. The budget of a program in 2010 poses 8,58 mil. PLN and is covered from government sources. Entrepreneur can obtain maximum support in amount of 15 thousand PLN and aggravated expenditures can be financed up to 100%. The time for submitting an application is from 5<sup>th</sup> March 2010 till 30<sup>th</sup> June 2010 or till the sources for year 2010 depletes. Previous years were budgeted accordingly 7,65 mil. PLN in 2009 and 9,15 mil. PLN in 2008 ([www.parp.gov.pl](http://www.parp.gov.pl)).

Cluster topic was also undertaken in other documents, both in national and regional operational programs for the years 2007-2013, regional innovation strategies and in numerous projects realized by regional development agencies and marshal's offices. The objective of all programs, structural documents and projects related to cluster concept is to enable different forms of support for clusters and cluster initiatives.

Cluster based-policy in Poland is being perceived as an element of innovation policy as clusters bring innovation and create links between business and science spreading the knowledge transfer.

## Current stage of cluster development in the Czech republic and Poland

The cluster concept in both countries is relatively new. It started to develop rapidly thanks to the European Union coherent policy stressing on the importance of competitiveness and innovativeness development. The new cluster-based policy appeared promoting cooperation and networking among three spheres: business, government and education (Triple Helix). A big "boom" on clustering broke out and the amount of clusters and cluster initiatives started to grow rapidly. Numerous entities were developed as a result of various projects based on the idea of co-opetition (conjunction of cooperation and competition) supported and financed by the government and/or the EU sources (top-down approach). Others appeared thanks to companies' own initiative and interest (bottom-up approach)<sup>1</sup>.

1 – These conclusions stem from research realized within the project titled "Cluster Performance Measurement and Management" (GA ČR „Měření a řízení výkonnosti klastrů“). The Faculty of Management and Economics at the Tomas Bata University in Zlín, Czech Republic was actively engaged in the project that has studied the subject of measur-

Nowadays, we can conclude that since the year 2006 when the clusters started to develop in a larger scale, a part of their initiatives has already disappeared. There may be several reasons for that. The primary reason can be the fact that "mapping phase" did not prove high enough potential in a cluster formation. Also, the failure of a cluster establishment could be lead by e.g. lack or low activity and/or enthusiasm of cluster leaders (managers, facilitators, key enterprises), eventually wrongly defined goals, activities and joint projects. In addition to that, many of previously created clusters met certain difficulties (mainly financing problems and distrust) and either stopped their activity, are in a stage of stagnation or go through the difficult phase of reorganization. Also, numerous cluster initiatives were not able to descend into a cluster (after finishing the project and its subsidies) and were abandoned.

Currently (May 2010), around 30 clusters and several cluster initiatives can be distinguished in the Czech Republic and over 80 clusters and further cluster initiatives in Poland.

Majority of clusters are in their early stage of development as they emerged in the year 2006 and after. In both countries, a big variety in regards to industry sectors (Fig.1, Fig.2) in which clusters emerge can be observed.

The most cluster friendly regions in the Czech Republic are Moravian-Silesian region and central part of the country where numerous clusters exist. In Poland, a great number of clusters emerged in southern and central sides of the country.

## Case studies

### An example of a successful Czech cluster – Envicrack Cluster of Alternative Energy

The Moravian-Silesian region (Moravskoslezský kraj) in the Czech Republic possesses a historical background connected with the energy industry, where many coke-oven plants, numerous companies and institutions interested in coke processes, material engineering and usage of coke gas for heating and electrical energy were created. The region is rich in ecological cargo sources in its area.

Here, in Ostrava the cluster ENVICRACK – Klastř Alternativních Zdrojů energie (Cluster of Alternative Energy) was founded in December 2006. Since the time of establishment by 17 founding members, the cluster grew in its number and currently concentrates 26 entities. 95% of cluster members

ing and management of cluster performance. The financial support for the project was provided by the Grant Agency of the Czech Republic. During the work on this project, an extensive research of clusters and cluster initiatives was carried out. Exploration was focused on obtaining the information in regards to the clusters management and experience in their functioning, from managers of Czech and foreign clusters. In research (2007 – 2008) took part 20 Czech and 42 foreign clusters (cluster managers) what represents four-fifths of clusters existing at that time. Nowadays, this research is being continued within project titled "Clusters performance measurement and management in Poland" under International Visegrad Fund no. 50910431 and the projects financed by the Internal Grant Agency of FaME TBU No. DP 9/10 and No. IGA/61/FaME/10/A ("The Development and Evaluation of the Performance of Cluster Policies, of Clusters and their Members with the Usage of the Principles of Benchmarking").

# Cluster initiatives in the Czech Republic

■ Established clusters – phase II ■ Cluster mapping ended  
■ Established clusters ■ Cluster mapping – phase I

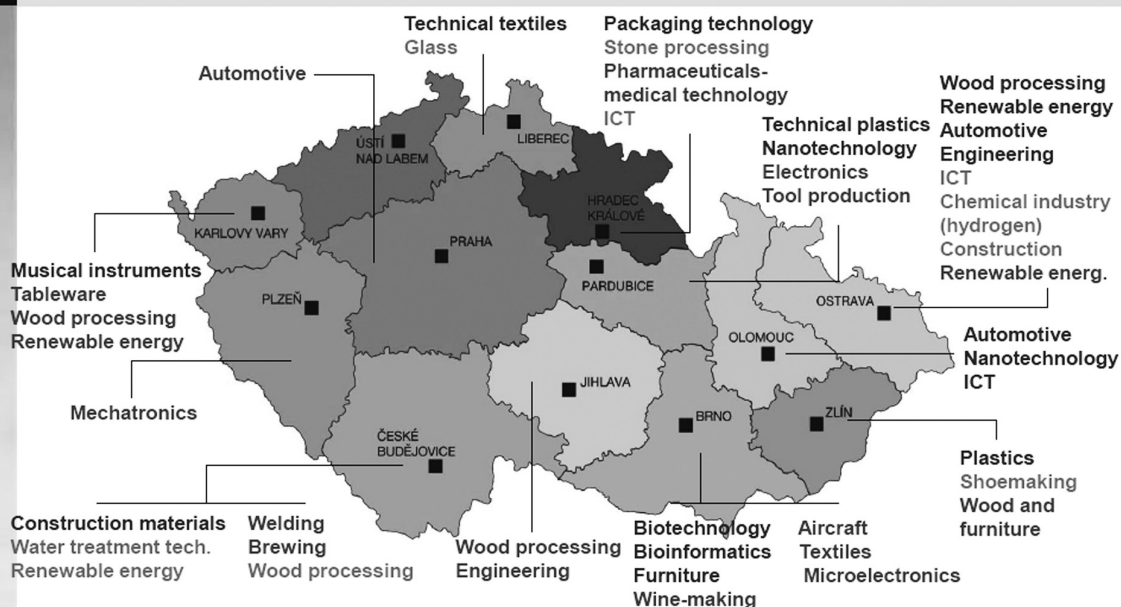


Figure 1: Cluster initiatives in the Czech Republic specified according to the regions and industry area

Source: [www.czechinvest.org](http://www.czechinvest.org)

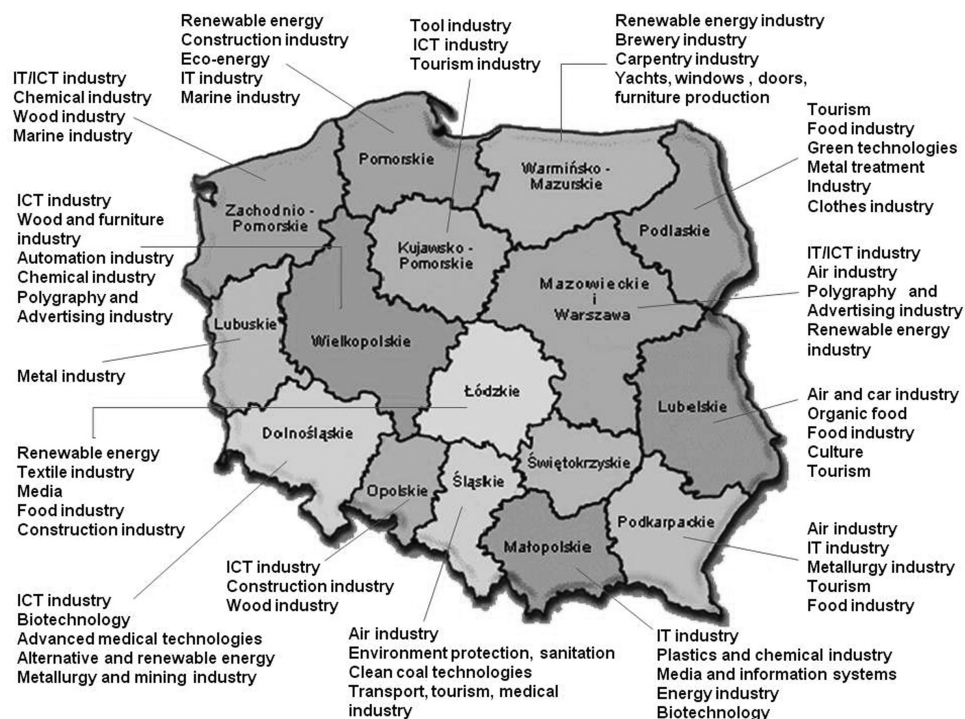


Figure 2: Cluster initiatives in Poland specified according to the regions and industry area

Source: Authors' own based on [www.pi.gov.pl](http://www.pi.gov.pl)

poses SMEs, the rest are the Technical University of Ostrava (VŠB-TU) and regional agency – the Union for the Development of the Moravian-Silesian Region (Sdružení pro rozvoj Moravskoslezského kraje). Three types of companies can be distinguished; those who deal with development, realization and consumption (enable use of technology in practice).

Envicrack was primarily focused on the liquidation of waste and the resulting gases and substances and later extended its activities into innovations in the usage of alternative and renewable sources of energy. “The cluster’s main activities are science and research activities in the preparation of waste for further utilization with the use of pyrolysis technology and in the area of using renewable and alternative sources of energy” (www.envicrack.cz).

The cluster’s main aim is to support activities connected with the area of renewable sources of energy, to deepen the cooperation linkages among cluster members and improve their competitiveness through usage of common potential. The supportive objectives include:

- Support and development of activities regarding R&D applications in relevant areas (preparation of waste for further utilization, usage of renewable and alternative sources of energy e.g. solar energy, innovation in rail transportation-reduction in energy consumption through recuperation and energy accumulation),
- Development of innovative activities within cluster,
- Endeavor to achieve a position in the foreign markets and maximize cluster’s export performance,
- Development of activities oriented on environment improvement in the community and region.

In the first phase of its development (2006-2009), cluster oriented its activity on the project “Pyrolysis processing of sorted waste in order to combine production of electrical energy and heat”. A result of development in this area was the completion of the pilot project “Pyrotronic” and construction of pilot installations “Pyromatic” – so called electric furnace pyrolysis, which enables acquisition and analysis of information necessary to develop large equipment for processing sorted waste.

Nowadays, the cluster has extended its activities into a new sector oriented on the usage of alternative sources of energy within which the projects regarding the pyrolysis technology, solar energy and innovation in rail transportation are being realized. In addition to that, other projects such as human resource development and common cluster promotion are being carried out.

Additionally, together with other clusters, universities and government institutions, Envicrack participated in the creation of the National Cluster Association (Národní Klastrová Asociace) in the Czech Republic, whose aim is to coordinate and contribute to a sustainable development of cluster initiatives and the cluster-based policy in the country. The cluster also takes part in ClusterNet platform, which possesses a useful tool for communication across different business sectors.

The cluster managed to obtain financial support from the EU Structural Funds for its activities. The first subsidy it re-

ceived was from the OPIE Clusters (12 mil. CZK) and currently it has been supported from OPEI Cooperation (49 mil. CZK).

Cluster activities (except subsidy) are partially financed by member fees, but largely from loans from private sources of cluster members. A major problem with financing cluster projects was due to its inability to recognize and honor some of the cost of subsidies from OPIE Clusters (costs associated with construction of equipment used for operating new technologies).

#### *The biggest successes:*

- The cluster success was mainly due to the fact that a gap in the market during the time of a missing technology (pyrolysis technology for processing sorted waste) was found and filled;
- Another crucial moment was an extension of cluster activities to the sector of usage of alternative sources of energy.

*From the management and decision-making point of view, the following aspects have contributed to the successful cluster development:*

- An outcome of cooperation of favorable companies which decided to join their efforts in a cluster in order to achieve common aims;
- Good leadership in a cluster;
- Finding support in sponsorship in the first stage of cluster activities.

#### *Problems hampering cluster’s activity:*

- Insufficient sources for financing research and development plans
- Problems connected with obtaining financial support – complex administrative requirement for obtaining subsidy.

#### **An example of a successful Polish cluster – the Aviation Valley**

Poland possesses a big potential in the aviation and aerospace industry development. In 1937, when the Polish government created Centralny Okręg Przemysłowy (COP) – the Central Industry District, the southern-east part of Poland became the most attractive area for this industry. The factory, WSK PZL Rzeszów S.A. producing engines and numerous numbers of other factories connected with the aviation were founded. Today, the aviation history reaches 100 years and has a history of the aviation industry in the region of over 70 years. In Rzeszów, the capital of Podkarpackie voivodship and an important communication and trade centre, Stowarzyszenie Grupy Przedsiębiorców Przemysłu Lotniczego Dolina Lotnicza (the Aviation Valley) was founded, concentrating around itself numerous amount of enterprises oriented on the aviation and aerospace area of production (Lentowicz, 2010).

The Aviation Valley was founded in April 2003. The cluster was established by 18 founder members with the intention of improving the conditions of their companies. Furthermore,

in order to develop dynamically, they wanted to build up the value chain of contractors, stimulating the formation of small and medium enterprises connected with the industry (Rybka, 2008).

Since that time, the Aviation Valley has been developing rapidly. The amount of entities entering the cluster structure has been growing fast, reaching 75 entities in 2009 (72 companies, 2 agencies: Rzeszów Regional Development Agency S.A. – RARR and Mielec Regional Development Agency S.A. – MARR, and Rzeszów University of Technology). Currently (March 2010), it represents 80 aerospace companies. Further firms are within the application process. The structure of entrepreneurship within the cluster is diversified where the biggest group possesses SMEs (over 70%). The Aviation Valley is an interregional cluster spreading throughout four voivodships, from Bielsko-Biała (Śląskie voivodship) through Małopolskie and Podkarpackie voivodships to Świdnik (Lubelskie voivodship) with the biggest concentration of companies (approximately 80-90%) in Rzeszów and surroundings (Podkarpackie voivodship).

The Aviation Valley is a well-known producer of small planes and helicopters. In addition to that, it is a supplier of the best products to the most modern planes in the world such as Boeing Dreamliner 787 and Airbus 380.

The clusters' main goal is to support entrepreneurship in the aviation industry. The supportive objectives include:

- "Organization and development of a low cost suppliers' chain,
- Creation of favorable conditions in order to enhance the development of the aerospace industry enterprises in the region,
- Further development of the aerospace research, skills and qualifications,
- Cooperation for development of the industry and technical universities which would promote new ideas and develop the research and development sector within the aerospace industry,
- Promotion of the Polish aerospace industry,
- Protection of the aerospace industry enterprises and businesses,
- Biasing the Polish government's economic policy in favour of the aerospace industry"<sup>2</sup>.

A strategic objective of the Aviation Valley is to transform southern-east part of Poland into one of the leading aviation regions in Europe.

The cluster characterizes high activity in various ventures. The Aviation Valley itself provides a wide range of activities both for its members as well as for the surrounding. Cluster undertakes many initiatives within different fields not only research and science but also education and culture. In 2004, together with Rzeszów University of Technology and 10 best Polish Universities of Technology and research centers (e.g. Warsaw University of Technology, Silesian University of

Technology, Lublin University of Technology and others), the AERONET Centre for Advanced Technology was created. The AERONET Centre is a place where scientific research regarding the aircraft construction, cutting edge processes of material engineering and the fabrication techniques in the aviation industry are being conducted. Thanks to the AERONET Centre activity, new Laboratory for Testing Materials and Materials Engineering was founded in 2007. The cluster is also responsible for establishing the first Polish Aerospace Technology Platform in 2005. This platform enables an integration of the aviation environment and combines the world of science and industry (involvement of research institutions, universities etc.). Furthermore, the Aviation Valley and technical high schools from five cities in Podkarpackie voivodship (Rzeszów, Mielec, Stalowa Wola, Krosno, Ropczyce) established an agreement CEKSO: Centrum Kształcenia Operatorów within Centrum Kształcenia Praktycznego (CKP) in Rzeszów. Currently, 12 cities take part in the agreement. The main aim of CEKSO is a coordination of education in technical schools in the voivodship with actual industry needs, and training of 1000 CNC operators per year. In the long-term, its aim is to become a world class centre. CKP adjusts and educates young people according to the requirements posed towards future employees of cluster companies. Additionally, the cluster is planning to create a place of education for children called "Eksploratorium", where the youngest would be enhanced to learn sciences like mathematics, logics etc. through fun and games. Moreover, many annual cultural events in voivodship (connected with aviation) are organized under the patronage of Aviation Valley e.g. Aviation Festival, Mountain Hot-Air Balloon Contest, International Amateur Flying Constructions Rally, World Cup Qualifying Heats in Model-Making, Air Picnic and others. The cluster offers comprehensive forms of activity and is open for new ideas of collaboration.

At the beginning of its activity in 2004, the cluster was mainly financed (in 96%) by the biggest entrepreneurship in the region – Pratt&Whitney – \$300 000 USD support. Only 4% of the financing derived from the membership fees. Gradually, support of Pratt&Whitney started to be taken over in aid from other financing sources. Projects co-financed by the European Union and the membership fees grew in importance. In 2007, the share of support from Pratt&Whitney was on the level of 28%, membership fees – 14% and support from the EU projects 58% (Rybka, 2008). Thanks to that support, the cluster had the possibility to apply for funding from the Structural Funds, from projects such as INTERREG, ZPO-RR (IROP), Enterprise Europe Network or project Foresight "Kierunki rozwoju technologii materiałowych na potrzeby klastra lotniczego Dolina Lotnicza" financed from the ERDF. Currently, cluster activities are financed from membership fees, the EU resources and contributions/grants from regional and communal resources.

Aviation Valley is a good example of a broad cooperation. Thanks to the membership of Poland in the EU, cluster develops collaboration with technologically advanced regions inter alia from Finland, Ireland and France. Together with other European clusters from aviation sector (e.g. the Aero-

2 – Od Centralnego Ogręgu Przemysłowego do Doliny Lotniczej. Tradycje i współczesność na Podkarpaciu. Podkarpackie. Wydawnictwo Arete II. ISBN 978-83-89688-89-7.

space Valley in France, the Hegan Basque Aerospace Cluster in Spain, the Skywin Aerospace Cluster of Wallonia, the Companiaerospace from Italy, Hamburg region, the HAC Hungarian Aerospace Cluster) and the Farnborough Aerospace Consortium (FAC) in England, the Aviation Valley created a bilateral agreement – a network of cooperation “Wings for regions”. Nevertheless, as the worldwide competitive pressure continued, new ideas for collaboration appeared. Therefore, in order to successfully compete on a global level, the Aviation Valley participated in a creation of the European Aerospace Cluster Partnership (EACP), “platform for mutual exchange, policy learning, and cooperation to achieve high-level performance among the European aerospace clusters” ([www.eacp-aero.eu](http://www.eacp-aero.eu)). Additionally, for future development, the extension of cooperation into Asian markets is being planned.

*The biggest successes:*

- Broad cooperation with education sphere – support of education in technical schools in the voivodship – creation of an education centre CEKSO,
- Development of innovative and unique solutions in the industry area – the Centre of Advanced Technology “AE-RONET – the Aviation Valley”,
- Strong brand name promotes the region (as the voivodship’s capital, Rzeszów, advertises itself as a capital of the Aviation Valley) and the country in the international arena,
- Broad cooperation in the international scale (attraction of foreign investors e.g. from Germany).

*From the management and decision-making point of view, the following aspects have contributed to the successful cluster development:*

- Management commitment and enthusiasm,
- Ability to listen to the entrepreneurs’ needs, openness for suggestions, undertaking initiatives,
- The Aviation Valley started its activity based on a support from the biggest entrepreneurship in the region, Pratt&Whitney and these sources posed 96% of financing at the beginning of cluster activity. Thanks to that support, the cluster obtain an opportunity to apply for further sources from structural funds from projects such as INTERREG, ZPORR or Enterprise Europe Network.

*Problems hampering cluster’s activity:*

- Incomprehension of the understanding of clusters’ needs by authorities oriented on supporting clusters (programs assumptions depart from real possibility of spending the sources),
- Problems connected with obtaining financial support – bureaucracy, ambiguity in programs’ records, wrong proportion of financial support in regards to various expenses.

## 4. Discussion

### What affects the successful development of a cluster?

What can contribute greatly to the progress of clusters and to the support of their performance? Since a cluster performance is not a single-dimensional concept, it is necessary to look at a range of factors influencing this performance.

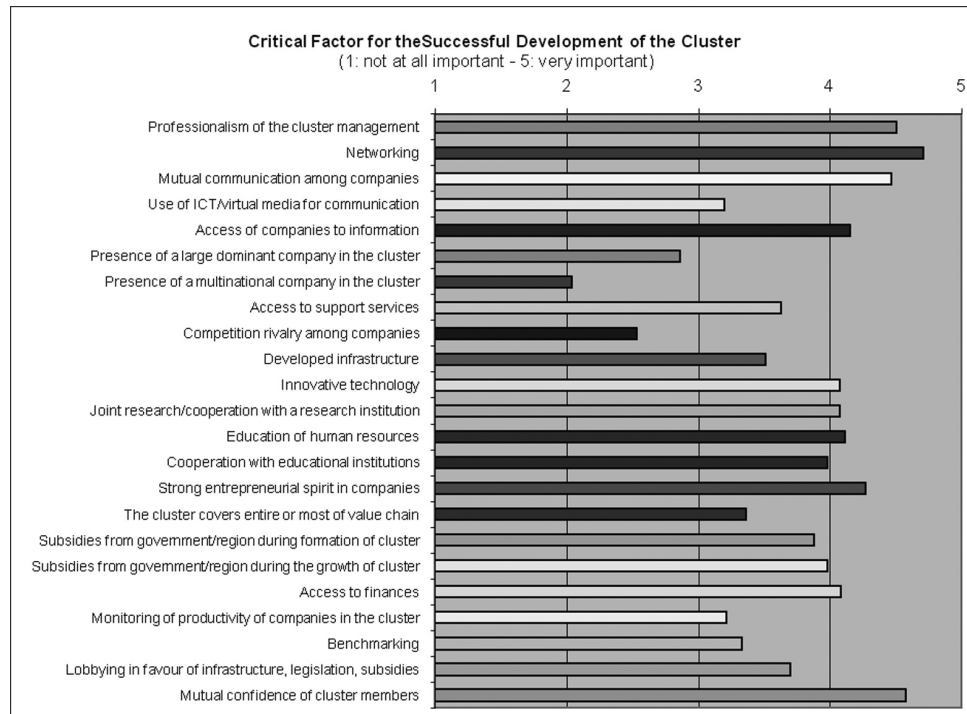
The results from the research have shown that the **most significant aspects of decision-making and management** leading to a success of a cluster perceived by the cluster managers is a high-quality management with clearly defined goals, clear cluster vision and strategic plan. Furthermore, members’ mutual trust, willingness to cooperate and involvement are additional factors mentioned. Also, the quality of established relationship and regular communication are underlined as important. In addition to that, the significance of the personality of a cluster manager or chairman, and personal contacts between the management and the cluster members is being pinpointed. It is obvious that personal dimensions of a cluster play a crucial role in its successful growth.

Another area of decisions affecting the success of a cluster, according to the managers’ opinion, is the manner in which it is financed. The importance of securing financial means for the growth of a cluster is generally stressed by the managers as in the case of Czech and Polish clusters, which relies in the form of promises of receiving grants from public resources. For this reason, building good relations with the public sector is critical.

The **results** that the clusters have already achieved are also closely connected with the aspects of management and decision-making and are considered to be their success. Besides the individual implemented mutual projects, the cluster managers consider primarily the creation of functional environment of cooperation and mutual trust among members as a cluster success. Another positive result is building up of an informational and communicational platform, which improves the access of the companies to information and supports the exchange of experience and know-how. The acquisition of financial resources for projects, e.g. in the form of grants or risk capital also reckons as a cluster success.

These propositions have been preliminary confirmed by the authors’ own survey (as mentioned above). The following aspects were identified as being essential for the cluster development and cluster performance management:

- Networking and mutual communication among cluster members;
- Professionalism of the cluster management;
- Mutual confidence and communication among cluster members;
- Strong entrepreneurial spirit in companies;
- Joint research or cooperation with a research institutions;
- Access to finances;
- Access of companies to information;
- Cooperation with educational institutions;
- Education of human resources;
- Innovative technologies,
- Subsidies from government/region during the growth of cluster.



**Figure 3:** Cluster managers' opinion on the critical factors for the successful development of the cluster  
Source: Own research (based on the research project "Cluster Performance Measurement and Management", 2008)

More detailed results of a survey regarding cluster managers' opinion can be seen in Fig. 3.

On the other hand, identified key factors for the successful growth of a cluster are tied in with **problems** listed by the cluster managers. The key factors, which the individual clusters cannot control to their own advantage become logically evident as distinctive problems hampering successful development of a cluster. The most significant restraint of the growth of a cluster turned out to be a shortage of financial resources combined with the problem of advance financing of joint activities. This problem is amplified by bad experience of some Czech and Polish clusters with acquisition of grants from public resources for cluster mapping and development. Specifically, this concerns poor clarification of conditions and their changes, the methodology of eligible costs, prolonged administration of submitted projects and requests for payment of grants, lack of experience of project managers of grant providers and bureaucracy connected with the financing of projects from the EU resources.

Personnel staffing in the cluster, for example a shortage of qualified employees, may also cause problems. Major issues causing such limitations are passivity of the member companies, their distrust, and unwillingness to cooperate and/or to find time for cluster activities. Some clusters also mentioned problems caused by poorly defined goals and poor implementation of strategy. Additionally, for the reason of large diversity of the companies in the cluster, searching for common interest and spheres of mutual activities can also be viewed as an obstacle for cluster growth.

Based on the results of the research and on the example of ENVICRACK and the Aviation Valley, the following good

practices, which contributed to the cluster development, can be highlighted:

#### ▪ Historical background of an industry

Conducive environment rich in traditions and resources, and historical background of a particular sector in the region have a significant meaning for cluster development in that industry.

#### ▪ Formation of a balanced structure of a cluster

It is essential to pay attention to keep the structure of the cluster in balance and watch for a situation, where the process of the growth of a cluster would be dominated by only a few of the elite individuals, or a single company, which would shape the events in the cluster for its own advantage.

#### ▪ Formation of a capable management group of a cluster

This includes the selection of a cluster facilitator; putting together the project team lead by a cluster manager and assembling the executive board and the supervisory board of the cluster. It is important to involve in it representatives of all groups of participants in the cluster, that is, representatives of the leading companies, small and mid-size companies, academia, regional institutions etc. The leading group should be put together in such a way that it would comprise all competencies necessary for a successful development of the cluster in its individual phases and sufficiently qualified and also very strong, active and proactive in order to be able to motivate the participants in the cluster. Another desirable and extremely important characteristic of a cluster management group is the ability to listen to the entrepreneurs' needs

and be open for their suggestions and ideas, and thanks to that make “the right choices”.

#### ▪ **Recruitment of ‘leaders’ of a cluster**

It is common that a large majority of participants in a cluster play only a passive role in the initial phases because they are not sufficiently convinced about possible benefits. Therefore, it is absolutely essential for a continuous growth of a cluster to recruit members that drive the cluster forward by their involvement and enthusiasm. These leading personalities then transfer their energy and creativity to the other more passive members of the cluster, and drive them in additional activities.

#### ▪ **Organization of a common joint project and achieving first quick successes**

It is necessary to prepare an initial portfolio of initiatives, which should provide benefits to a large number of participants in the cluster and assure spreading of risk. Not every initiative bears fruits; at the beginning, it is necessary to focus on initiatives with small risk and fast return.

#### ▪ **Utilization of support programs (governmental and regional) and securing the transition from public to private sources of financing**

Public institutions such as governmental and regional organizations, institutions for the technology transfer and regional development agencies are important for the initial development phases of a cluster. Beside financial support, public institutions should provide the clusters with additional services and activities. This may be, for example, a support for the establishment of cluster strategy, identification and initiation of projects, mediation of contacts to additional partners, support for transfer of knowledge between clusters in the region, integration of regional clusters into the national and multinational networks, projects and programs, joint marketing activity for the benefit of the region etc.

#### ▪ **Connection of a cluster to the existing scientific research network and educational institutions**

In this way, members of a cluster have access to the network of research institutions, universities and technical centers in the region, and can utilize their resources and knowledge.

Additionally, undertaking different initiatives aimed at integrating science and education into strong and tight relationship in a knowledge triangle: science-education-enterprise (industry) stimulates cluster’s innovativeness and creativity.

#### ▪ **Supporting the education of employees and human resources development**

A major problem of companies in many regions is the lack of human resources with adequate knowledge, both at the workers and managers level. Being aware of that, numerous clusters work on joint development of human resources investing in knowledge and education.

#### ▪ **Supporting the mutual cooperation of clusters**

Mutual cooperation of clusters (cross-cluster cooperation) represents an important cluster activity. It often comes out that regional clusters are not mutually interconnected. Representatives of regional institutions often do not utilize already existing and potential connections between differently developed clusters in the given region. Therefore, for the reason of mutual learning and further development, it is crucial for the cluster to be open for collaboration on local (regional) and/or global (international) level.

Because of the diversity of the clusters, it is necessary to note that not all recommendations are suitable for all clusters in general.

### **Conclusion**

Distinguished factors show how important is the dialogue with all spheres of economy. The Etzkowitz model of Triple Helix stressing the significance of industry, research (academia) institutions and government agencies relationship has been extended into New Triple Helix approach focusing on dependence of creativity, entrepreneurship and eco-system (Quinn, 2009). Therefore, cluster success not only depends on the support of different partners but also on creativity and capacity of the right understanding of the clustering idea (know – why concept). In addition to that, the entrepreneurs cooperating within the cluster structure have to be flexible and quickly adjust to the actual market needs as a cluster’s strength lays inside companies and/or industry sector. Strong inside cluster has to be open for outside collaboration, as individual cluster entities are no longer taken into consideration but the whole eco-systems. The innovation is being transferred from a cluster into the innovative eco-systems and cross-cluster cooperation appears as a new tool for competitive strategy (Bialic-Davendra, Pavelková, 2009).

ENVICRACK and the Aviation Valley pose as good examples of entities joining business, education and science into one coherent cluster structure. Its success can be owed to a series of internal factors among which the history and natural resources of the region, and own initiative and interest in collaboration undertaken by companies (contributed to healthy development of cluster from the beginning) have to be pinpointed. Involvement of companies, reliance, willingness to combine available resources and a good communication matrix conducive to strengthening and tightening the linkages among enterprises are essential. Very crucial is also the cluster management’s ability to listen to the entrepreneurs and their expectations as from companies themselves flow ideas for further development. Strong and healthy internal connections support further external development – from interregional to international scale.

## Abstrakt

Cílem tohoto příspěvku bylo pokusit se definovat faktory, které ovlivňují vznik a rozvoj klastrů v České republice a Polsku. Autorky v úvodní části článku popisují existující klastrové politiky a současný stav rozvoje klastrů v těchto zemích. Na základě případových studií českého klastru Envicrack a polského klastru Aviation Valley a dalších výzkumů navazujících na řešený projekt autorky následně definují klíčové faktory a uvádí doporučení v podobě aktivit, které obecně mohou ovlivnit úspěšný rozvoj klastrů. Patří mezi ně například: vytvoření vyvážené struktury klastru; vytvoření schopné řídicí skupiny klastru; získání „tahounů“ klastru; organizace společných projektů a realizace prvních rychlých úspěchů; využití podpůrných programů; napojení klastru na existující vědecko-výzkumnou síť; podpora vzdělávání a rozvoje lidských zdrojů; vzájemná spolupráce klastrů atd.

Uvedené klíčové faktory ukazují, jak důležitá je vzájemná spolupráce různých sfér dané ekonomiky. Této problematice se věnuje model Triple Helix (dle Etzkowitz), který zdůrazňuje význam vzájemných vztahů průmyslové sféry, výzkumné sféry (akademické) a vládních institucí, a jeho rozšířený přístup tzv. New Triple Helix, který se zaměřuje na vzájemné závislosti kreativity, podnikání a eco-systémů (Quinn, 2009). Úspěch klastrů tedy nezávisí jen na podpoře a propojení různých subjektů v ekonomice, ale také na kreativitě a úrovni pochopení myšlenky klastru (tzv. know – why concept). Je nutné, aby samotné podniky a podnikatelé zapojení do klastru byli dostatečně flexibilní a rychle reagovali na požadavky trhu. Síla klastru vyplývá z možností samotných průmyslových podniků. Úspěšný kluster musí být otevřený pro spolupráci s ostatními subjekty, jeho členové musí být vnímáni jako celek ne jako jednotlivé samostatné jednotky. Novou strategickou možností pro zvýšení konkurenceschopnosti je možnost zvýšit inovační potenciál prostřednictvím spolupráce celého klastru jako systému a také vzájemná spolupráce několika různých klastrů (Bialic-Davendra, Pavelková, 2009).

Oba uvedené příklady klastrů představují úspěšný model vzájemného propojení průmyslu, akademické a vědecké sféry do jednoho celku. Za svůj úspěch vděčí mnoha interním faktorům, jako je jejich historie, přirozené podmínky daného regionu, charakter podniků. Důležitá je ochota firem spolupracovat, komunikovat, sdílet své zdroje, což vede k posílení jejich vzájemných vazeb. Klíčová je také schopnost managementu klastru reagovat na očekávání jednotlivých členů klastru a stanovit správné cíle pro budoucí rozvoj klastru. Silné a zdravé vnitřní vazby podporují vnější rozvoj celého klastru.

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