

Clusters phenomenon from Polish perspective

M. Bialic-Davendra, and D. Pavelkova

Abstract— Rapid development of a global economy underlines an increasing importance of competitiveness. The phenomenon of competition is involved in all spheres of our life. It appears between the countries or economies in a global context, companies contesting markets, and between people competing with one another. It is characterized by many layers. Competitiveness constitutes an indispensable element of the very complex and multi-dimensional phenomenon of clusters.

This paper presents the phenomenon of clusters from the Polish perspective. It characterizes the background for clusters growth in Poland, their current stage of development and the existing cluster-based policy. Based on the examined group of Polish clusters, vital characteristics regarding clusters' structure, activities, management and financing are being distinguished and depicted. In addition to that, pinpointing the best practices implemented and at the same time, confronting the problems which came across, allows determining the existing conditions in Poland and putting more attention to the features which have to be improved in order to enable successful cluster development in the future.

Keywords— cluster, cluster policy, development, Poland.

I. INTRODUCTION

THE fundamentals of clusters contain the concept of industry districts formulated by the British economist, Alfred Marshall in the end of the XIX century. Marshall [1], noticed the tendency of particular industries to concentrate in specified locations (gathering small companies with similar and complementary profiles) and therefore attracting external benefits for the region and industry (companies) itself.

Today, the presence of the cluster concept is being observed in supranational and national policies and strategies for economic development of countries. Clusters are regarded as an important development tool by world organizations e.g. the Organization for Economic Co-operation and Development (OECD), the United Nations Industrial Development Organization (UNIDO), the World Bank or the European Union (EU), and hence the clustering idea grows in popularity.

The main reason of cluster building process was to strengthen the industry's ability to innovate and increase national competitiveness. Global markets therefore are no longer determined by single companies but increasingly by

entire industries and branches. Clusters became an effective tool facilitating and stimulating entrepreneurship progress, stimulating and maintaining competitiveness, and a tool for competitive strategy. They became an approach to foster innovation, co-operation and internationalization among companies and regions to succeed in global competition.

It is not easy to define a "cluster". Since its concept is being used in regards to a variety of business structures and for different purposes, numerous definitions have been developed so far [2], [3], [4], [5], [6], [7], [8]. However defined, the cluster phenomenon is being described as an effective tool, stimulating development of entities linked within its structure and thereby contributing to economic growth. Various definitions developed over the last twenty years [6], [9], [10], [11], [12], [13], [14], [15], [16] allow concluding that there is no standard one agreed upon "cluster". Nevertheless, most of them underline the presence of geographical proximity of companies and business surrounding institutions, horizontal and vertical linkages, and cooperation and competition among entities.

The most popular is Porter's [9], [17] perspective, defining cluster as geographical concentration of interrelated companies, specialized suppliers, service providers, business operating in similar sectors as well as related institutions (governmental, educational, think tanks etc.) in a particular field, which collaborate and as well as compete. A cluster phenomenon combines numerous diverse entities from various areas of industry, education, science and government into one coherent structure. There are many typologies of clusters which emphasize different dimensions of their variability such as e.g. size, breadth, density, state of development, innovative capacity etc. [11], [14], [18]. Clusters as a structure can be identified in several ways through various steps [2], [19], [20]. Moreover, following [2], there are certain characteristics which can be distinguished among others as a geographical proximity of various actors (multiple organizations) linked within a cluster by co-opetition, with their focus on common core business (activity). Clusters' actors link the spheres of industry, education and government. According to [6], five sets of actors can be distinguished (Fig. 1). Entrepreneurships represent buyers and suppliers of goods and services, companies sharing common technologies, labour skills etc. The government actors include national, regional and local institutions, agencies and other units involved in industry and economic development policies. Financial institutions involve banks, venture capital, business angles etc. Research community includes academic actors such as universities and

Authors are thankful to the International Visegrad Fund no. 51000656 and the Internal Grant Agency of FaME TBU No. DP 9/10 for financial support to carry out this research.

M. Bialic-Davendra is with the Tomas Bata University in Zlin, Zlin, 760 01 Czech Republic (phone: +420-776-608-996; fax: +420-576-032-559; e-mail: bialic@fame.utb.cz).

D. Pavelkova is with the Tomas Bata University in Zlin, Zlin, 760 01 Czech Republic (e-mail: pavelkova@fame.utb.cz).

colleges, research institutions, technology parks etc., and Institutions for collaboration (IFCs) involve public agencies, public-private organizations such as formal and informal networks [6], [21].

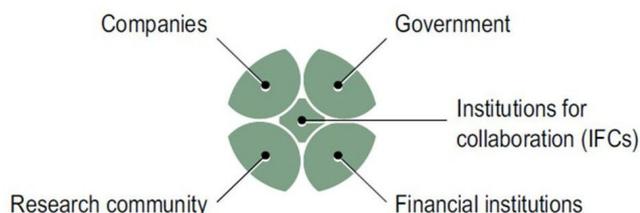


Fig. 1 five sets of actors composing a cluster
Source: Adapted from Sölvell, Lindqvist and Ketels (2003)

Cluster actors realize common activities in various areas within e.g. common projects, research, production, services etc. both with short-term and long-term perspective, which are always accomplished in connection with cluster vision and goals, and in regards to established priorities [22]. Another important characteristic constitutes the way in which clusters emerge [23], [24]. Two leading approaches can be distinguished:

- 1) Bottom-up approach – where cluster emerge due to the activity and/or initiative of particular groups of entrepreneurs;
- 2) Top-down approach – where cluster emerge due to the action of economic policy.

A third approach often appears, where cluster emerge due to combination of both distinguished approaches and/or due to the historical conditions [23].

All distinguished characteristics are common for clusters but not necessary have to be present within their structure.

A great influence on clusters functioning may have a policy based on clusters realized in a particular region, therefore, it is vital to take it into consideration while speaking about clusters development in that area.

II. CLUSTER POLICY IN POLAND

Cluster policy in Europe started to be adapted since 1990, after the cluster concept was introduced and popularized by Porter.

Cluster policy can be defined as a set of various activities (strategies, programs, procedures etc.) focused on obtaining a concrete aim, which is an increase of socio-economic benefits thanks to the establishment and development of a cluster. Those activities are usually being realized throughout the period of several years according to a certain plan and assigned budget [22]. According to the Expert Group [25] “cluster policy is developed by national governments in cooperation with regional and local governments”.

The European Commission [25] defines that a cluster policy “is not an isolated, independent and well-defined discipline. It embraces all policies that affect the development of clusters, taking into account the synergies and interchanges between these policies. Many policies labeled under different

headings (regional policy, industrial policy, innovation policy, etc.) are in fact cluster policies”.

In Poland, there is no specified cluster policy and all activities directed towards clusters are realized within the innovativeness development on the national and regional level.

The first programme that had an influence on networking within Small and Medium Enterprises was the SME Clustering and Networking Programme launched in 1990’s co-ordinated by Polish Foundation for SME Development and Promotion. All 16 voivodships participated and 16 cluster plans appeared. Nevertheless, with no follow up plans, the programme did not bring expected results. The cluster concept was indicated later in LEED/CEI/EBRD Project on Clusters in Transition Economies 2001-2002 implemented in five Central European countries, including Poland. Its objectives were focused on raising the awareness about the cluster concept both on the governmental and business level, map existing conditions, exchange practices etc., and were realized through a set of meetings (seminars, study visits) [25].

However, cluster-based policy was introduced for the first time in 2002, when the Gdańsk Institute for Market Economics (Instytut Badań nad Gospodarką Rynkową) started its research oriented on analyzing both opportunities (potential) and barriers for cluster structures development in Polish economy, and to identify the aggregations in economic activity [26]. Further attention to cluster concept development in Poland was undertaken while entering the European Union structures. Since that time, various programmes and initiatives (with focus on clusters) were implemented in Poland, both on the European Union and national level, such as follows:

- *Training Program on Clustering* (“Program szkoleń promujących clustering”) – introduced by the government agency subordinated to the Ministry of Economy - the Polish Agency for Enterprise Development PAED (Polska Agencja Rozwoju Przedsiębiorczości - PARP) for the time frame from October 2005 till end of 2007. Its main goal was to introduce to both entrepreneurs and local government authorities a new idea of cooperation in the concept of clusters, to promote clustering (by trainings and organizing conferences regarding clusters) and undertaking common ventures vital for companies and regions development. Thanks to these activities, help in new clusters creation and development of those which already existed was provided [27].
- *The Pilot Program: Support for Clusters* (“Wsparcie na rozwój klastra”) – initiated by PAED in 2007. The main goal of the program was the improvement and development of competitiveness of existing cluster structures, which in turn had direct or indirect influence on further regional development. However, the program had a lot of limitations e.g. in regards to the application period, size of financial support, applicant itself etc. therefore it was non-reachable for many entities for which the conditions were simply too difficult to fulfill.
- *BSR InnoNET* - the Baltic Sea Region Innovation Network, *CEE-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 – all realized on the EU level within the time frame of 2006-2009. They aimed to create an environment for building strong industrial clusters and innovation poles; to focus on cluster and network policy; and to promote interaction and cooperation between regional, national and European funding schemes.

- *Innovation Express* (IE) - joint call (within *INNET*) supported by national/regional agencies and authorities; in Poland supported by PAED, introduced in 2008. It based its main goal on activities devoted to initiating, developing and boosting technological cooperation among European clusters, enhancing trans-national cooperation and aiming for future joint R&D and innovation projects development. IE offered special “matching tool” as an opportunity for clusters to establish contacts with new partners (other clusters) for future trans-national collaboration [28].

Clusters’ coordinators appreciated the most: broad area of activities eligible for support, its positive influence on business and scientific environment, increase of awareness of cluster concept and its benefits, and exchange of knowledge and good practices which are being applied both within the country and abroad.

- Pilot program *Bonds for innovation* (“Bon na innowacje”) – implemented by PAED for the years 2008-2010. Program aimed to support financially micro and small enterprises, initiate contacts among them and research institutions (thus indirectly supporting clusters).

Since the importance of the cluster phenomena was highlighted by the European Commission for the time period 2007-2013, the National Strategic Reference Frameworks and Operational Programmes in particular European countries (also in Poland) devoted more attention to clusters. The main strategic goal of the National Strategic Reference Framework NSRF in Poland (Narodowe Strategiczne Ramy Odniesienia 2007-2013 – NSRO) is to create conditions for an increase of competitiveness of the Polish economy based on knowledge and entrepreneurship. This goal is being realized through more specific aims pursued within so called operational programmes administrated by the Ministry of Regional Development, regional operational programmes administrated by boards of particular voivodships and projects co-financed from structural instruments. Amongst all, the Operational Program Innovative Economy OP IE (Program Operacyjny Innowacyjna Gospodarka - PO IG) for the years 2007-2013 has to be distinguished. OP IE constitutes one of the instruments of implementing and realizing actions of the document titled “Directions for economy innovation increase for the years 2007-2013” (Kierunki zwiększania innowacyjności gospodarki na lata 2007-2013) accepted by the government in 2006 (articulating in its chapter “Infrastructure for Innovation” the significance of supporting joint activities of enterprises with

networking character and directed on the realization of innovation ventures). OP IE with its fifth priority “Diffusion of Innovations” deserves an attention in regards to the cluster concept and cooperation development. The priority underlines that cooperation among entrepreneurs and between entrepreneurs and surrounding institutions especially research units, plays a significant role in their development and creates convenient conditions for creation of new solutions, exchange of experience and better usage of resources owned by individual entities. Under one of its measures - 5.1 “Support for the development of supra-regional cooperative relations”, support for joint projects of the groups of participants is being granted [29].

Other operational programs indirectly influencing cluster development are Operational Programme Human Capital (OP HC) (Program Operacyjny Kapitał Ludzki 2007-2013) with its Priority II and Sub-measure 2.1.3 System support for increasing the adaptation potential of employees and entrepreneurs, and Operational Programme Development of Eastern Poland (OP DEP) (Program Operacyjny Rozwój Polski Wschodniej) with its Priority I: Modern Economy and Sub-measure I.4. Promotion and cooperation. Also realized on the EU level (including Poland), the Competitiveness and Innovation Framework Programme (CIP) and 7th Framework Programme for Research, Technological Development and Demonstration (FP7-RTD) through supporting innovations and competitiveness influence cluster concept development.

The aim of all programs, documents, projects and initiatives related to cluster concept is to support clusters and cluster initiatives development in the country. However, due to the fact that there is no defined cluster policy in Poland, all sources of support are scattered within different policies such as innovation policy or policy oriented on regional development. As Gulda [30] aptly notices “cluster policy does not constitute as separate branch of policy in Poland and there is no government document which would directly speak about it. Cluster policy is treated as part of innovation policy. The most reference to clusters issue can be found in strategic documents connected with innovations. (...) Clusters do not pose as separate subject of national policy but extremely important instrument which allows combining and implementing other types of policy: innovative, connected with regional development and with research and development sphere”. Also Szultka [31] accurately states that “there is a lack of complex national policy which would support clusters as a whole in such a way as to coordinate policy instruments from various areas towards clusters’ angle. Clusters in Poland are rather treated as one of many instruments”. The reason may lie in the fact of a comparatively young history and limited experience concerning clusters and cluster initiatives in Poland.

III. CLUSTERS DEVELOPMENT IN POLAND

Due to the importance and emphasis put on competitiveness and cooperation in today’s global economy, the clusters phenomenon in Poland started to grow in popularity in the last decade.

The first attempt to diagnose and map potential clusters in

Poland was undertaken by the Gdańsk Institute for Market Economics, after entering the European Union structures, during the years 2004 and 2005. Further research was conducted by PAED appointed as the main agency supporting clusters and responsible for implementing policy based on clusters in Poland. According to Portal Innowacji (PI) [32], PAED identified 130 clusters and cluster initiatives in Poland (with the status on November 2008). The biggest intensity of clusters was observed in central-eastern side of Poland in Lubelskie voivodship, Podkarpackie voivodship, Małopolskie voivodship, Śląskie voivodship, Świętokrzyskie and Łódzkie voivodships. On the contrary, the lowest intensity occurred in Lubuskie and Opolskie voivodships.

IV. RESULTS OF RESEARCH CONDUCTED

A. Basic characteristics of research sample

Within this research, a sample of 57 Polish clusters was examined. 43 clusters from the sample (75%) took full part in the study; the remaining 14 (25%) constitute a portion of entities (clusters/cluster initiatives) which stated to be currently under reconstruction process or in preparation to formulate, inactive or their activity was suspended, or stated about the fact that the initially planned initiative was not realized, or about projects carrying the name of a cluster (not cluster in itself).

The examined group of clusters (Fig. 2) characterizes comparatively young age of existence where 77% of clusters emerged in the year 2007 or after. The oldest cluster, the Tarnow Industrial Cluster was established in 1999, the youngest Nadwiślański Klaster Energii Odnawialnej (in the area of renewable energy) in 2009. The sample distinguishes a wide range of industries in which clusters operate in, starting from heavy traditional industries such as building industry, wood industry, automotive industry etc., to new industries using modern technologies such as life science, optoelectronics, ICT, renewable energy etc.

Polish clusters emerge due to the various reasons (Fig. 3).



Fig. 3 primary impulse for cluster establishment in Poland
 Source: Own research

As the main primary impulse for cluster establishment, cluster managers (from the sample group) pinpointed the companies' own interest and initiative (72%) – the bottom-up



Fig. 2 sample group of Polish clusters according to the voivodships
 Source: Own research

approach. However, a combination of this approach with support from the university, as well as other institutions such as research institutes, business support institutions, city community, poviát support etc. also appears as very popular in Poland. None of the clusters emerged due to government support, which may be the result of lack of defined cluster policy in the country.

Established clusters function within different forms and do not necessarily have to have a specified legal form. Only a slight majority (53%) of examined clusters operate within a legal form, such as an association (it is the most common form), consortium, a joint-stock company, a limited company or a chamber of commerce; remaining 47% function on the basis of cooperative affiliations within the value chain or particular areas e.g. projects, research etc.

Also, the structure of clusters differs due to the variety of industries they operate in. The majority of clusters possess as its member, service organization (77%), research institute and university (65% each) within its organization, what comes as natural since from the definition, a cluster should contain the educational and R&D institutions within its structure. Among less popular appear commercial organizations, processors (manufacturers), equipment manufacturers and raw materials suppliers (in average approximately 30% of each). Also members such as local government units, agencies, associations, foundations, regional chambers etc. are sometimes present.

B. Common goals and cluster activities in the sample

The goals and activities of a particular cluster are set accordingly to its industry field, specialization and resources of the region in which this cluster is located. Even though, they may be specific to each cluster, they appear as common in principle. As a leading goal of the examined sample, the support for companies within the industry has to be highlighted. It is manifested in mutual cooperation of companies from the same branch that facilitates easier development of a branch strategy and effective lobbying for the sector. Additionally, the progress of innovativeness, competitiveness, quality, increase of production capacities and services of companies, and exchange of experience constitute as an integral part. Second in importance poses a creation and development of cooperation linkages, networks and platforms of collaboration among enterprises, local government (government), educational institutions, research and development units, and business surrounding institutions. An integration of industry (enterprises) with an education, science and government spheres constitutes a crucial factor in cluster development. The third most vital aim is the facilitation of innovation and technology transfer processes. Companies through combining their capacities and skills, cooperating with one another and with R&D units, technology parks etc. obtain better perspective for further progress than as individual entities. Furthermore, clusters aim for development of education and information activities (improvement of skills), promotion of regional development based on particular

industry (production) and support for local communities (ensure the social development, job opportunities etc.), and also for acquisition of new markets through collaboration and obtaining financial support for cluster progress.

The formulation of goals and strategies in the examined clusters usually lies in the hands of both cluster managers (63%) and top management of member companies in the cluster (49%). Representatives of universities (33%) play a significant role in many clusters, while dominant companies and representatives of a government or regional institutions only have a minor role.

Common goals in the cluster are being realized through joint activities of their members (cluster actors). They are being accomplished in various areas within e.g. common projects, research, production, services etc. both with short-term and long-term perspective. According to [22], the cluster activities usually follow a certain path, starting from creating a platform for mutual cooperation of firms (networking), followed by common projects realized in sales, human resources, production and marketing areas, and projects in the area of R&D in the end. In addition to that, cluster activities are always accomplished in connection with cluster vision and goals, and in regards to established priorities. On the basis of many research conducted [6], [33], [34], the cluster activities can be divided into the following areas:

- Networking;
- Human resources;
- Research and innovations;
- Business cooperation and promotion;
- Financing investment plans;
- Governmental/political area (lobbying);
- Supporting activities.

In the examined sample, networking constitutes as the most popular among all areas of activities. Within networking, the organization of common workshops, meetings etc. and arranging contacts among cluster members where 86% of sample clusters already offer these activities and the remaining are planning to offer it in the near future or upon request is considered the most vital. Information support (joint web page, newspaper, setting up information centre etc.) is also considered as very important as 63% of clusters already offer this activity with further 37% ready to offer it. A less important aspect appears to be arranging contacts with vendors and customers where only 40% of clusters currently offer the activity. Also other activities such as support of cooperation among particular segments in the cluster, creation of common platform for collaboration and integration of the industry environment are listed by clusters.

In the area of human resources, the sample group distinguishes organization of joint seminars and conferences and cooperation with educational institutions as the most important. Collaboration with research institutions and joint research are being distinguished within the area of research and innovations. Within business cooperation and promotion, the creation of a consistent image and brand of a cluster seems

to be the most vital. However, joint participation in trade fairs and advertisement are considered important as well. Among the remaining areas, the sample group highlights the significance of help in preparation and management of projects, lobbying for subsidies and mediacy in obtaining support services (e.g. banking services, insurance, legal, accounting and tax consultancy etc.).

Apart from collaboration on activities realized within a single cluster organization, examined clusters show an interest in cooperation on a wider scale understood as cluster-to-cluster cooperation. This new perception of clusters and collaboration influenced by rapid global economic development is inseparably connected with the fact that “many of the key attributes of clusters – notably their emphasis on networking and proximity based interaction – are now feasible on a global scale” and “firms are paying much less attention to location within one country or another” [33]. The presence of large innovation potential in cluster intersections has been noticed and the interest in cross-cluster collaboration started to rise.

Within the sample group, 70% of clusters declare their collaboration with at least one other cluster. This type of cooperation is usually based on exchange of information, knowledge, experience regarding cluster functioning (cluster management, coordination etc.) and models of collaboration in particular industry. In addition to that, preparation and/or realization of common projects and plans (mutual consultancy), organization of joint events with promotion character, conferences, workshops and seminars, or conducting joint research, are within common interest of cooperating sides.

In this type of collaboration, examined clusters see many benefits and opportunities for further development, such as:

- establishing contacts with potential partners;
- participation in study visits, workshops etc. and thus exchange of experience and knowledge;
- strengthening cooperation among companies within the same industry (branch) e.g. in Central European countries;
- learning from good practices of others;
- mutual learning - especially polish clusters within intra-country cooperation as clustering in Poland has a short history;
- assistance in cluster formalization;
- searching for tips on how to successfully develop cluster - from where and how to effectively apply for financial sources etc.;
- strengthening its competitive advantage - improvement of cluster competitiveness and increase of potential for its development and thus growth of cluster position as a partner in the ‘eyes’ of the surrounding;
- synergy of resources;
- joint stand on international trade fairs - the possibility to promote own cluster, more powerful marketing effect, better exhibition on international markets, preparation of common offer etc.;

- benefits of economies of scale;
- increase of the quality of own products;
- possibility of entering new markets for the companies-cluster members, obtaining new customers;
- easier possibility of influencing the EU policy towards clusters (strength in the group).

Apart from the advantages of cross-cluster collaboration, analyzed clusters underline certain drawbacks and barriers as well, to which they have to pay attention to, such as:

- lack or limited time for activities connected with cluster-to-cluster cooperation;
- mentality- distrust towards new partners, suspiciousness and lack of openness;
- fear of copying the ideas, new technologies etc., abuse of know-how, knowledge;
- economy espionage;
- too little commitment and involvement in cross-cluster activities;
- lack of belief that this type of partnership may bring benefits to everyone, not only to one side;
- lack of sufficient, available financial sources;
- fear of ‘harder’ competitiveness in regards to customers, applying for grants etc.;
- fear of losing the position on the market;
- fear of SMEs of dominance of large companies in clusters (and thus their passiveness, lack or limited interest in this type of cooperation);
- high costs of foreign workshops, study visits etc.;
- long time of decision-making processes.

C. Management and financing of clusters in the sample

Proper management of a cluster and financing of its activities are fundamental for its development.

Research conducted within the examined group of clusters, revealed that the majority of them (72%) do not have a professional cluster manager (a full-time job manager who has full control on cluster’s activity). It means that they function on a voluntary basis of clusters’ participants. They are very often managed by a group of managing directors (president or cluster manager, vice-president and board of members) which consists from e.g. companies’ representatives or representatives of other cooperative institutions (very often university representatives) who join their efforts to lead the cluster. This may have positive aspects such as passionate attitude of people who run the cluster for other reasons than financial benefits. On the other hand, a negative aspect is the lack or limited time of those who do voluntary work for the cluster.

Apart from the manager (director, president), other cluster employees such as an assistant, project manager, accountant who run the cluster daily, can be identified. In the case of the examined group, only a minority of clusters (19%) possess their own employees while 81% of them do not, which again indicates a voluntary work of people engaged in managing the cluster.

Cluster as well as every other organization in order to run its

activities needs to have certain financial sources. The sufficient budget is necessary in order to finance human resources (management, other cluster employees) and different projects (connected with research, promotion, education etc.), without which achievement of cluster objectives would not be possible.

In the case of voluntary work, the management does not require funding. In other clusters, the management is financed usually from more than one source. Primary financing sources include membership fees and contributions/subsidies from EU or/and government. Also clusters' own initiatives and contributions/grants from regional and communal resources are considered as important funding sources.

In regards to financing common projects and activities undertaken within the cluster, various sources can be distinguished as well. Firstly, clusters try to obtain financial support from the EU and government sources. Apart from that, clusters own initiatives and membership fees play a vital role. Furthermore, local and/or regional sources, coordinator resources, or companies' own resources are taken into consideration.

Additional financial sources coming from public or/and private funding may play a significant role especially for new, emerging clusters or cluster initiatives (might be used to encourage companies to collaborate e.g. on a new product or process) and stimulating role for further faster growth of these clusters which are already mature (with developed linkages inside and outside the cluster). Nevertheless, they may also attract entities to formulate artificial structures only for the purpose of acquiring financial support. Therefore, it is crucial for the policymakers to be aware that obtaining financial sources would not become an aim in itself.

D. Good practices and solutions implemented in clusters in the sample

It is not explicit as to how to successfully develop an individual cluster. Therefore, it is vital to distinguish good practices and solutions, which have been already implemented by others in order to draw conclusions and learn from them.

Among good practices, the following can be distinguished:

- strong association with education institution such as a university (technical university):
 - it is often an institution initiating, administering and/or coordinating cluster activity or a supporting member of a cluster;
 - many university staff are cluster members, which brings cluster benefits in usage of their knowledge for projects realization;
 - usage of university facilities for organization of conferences, seminars, forums etc. and for research (laboratories, equipment);
 - conducting research, expertise, consultancy, analysis for entrepreneurship;
 - technology transfer.
- investing in education - support for vocational education development (ensuring human resources with appropriate qualifications for the sector), creation of

special centers for education (e.g. education centre for the youngest), institutions for professional training in a particular industry sector, realization of traineeship projects (employment of graduates);

- investing in technology and innovations development e.g. Aviation Valley - Centre of Advanced Technology "AERONET - Aviation Valley", Medical Cluster of Eastern Poland – creation of research and engineering service centre, Tarnow Industrial Cluster – creation of technological and industry parks, as well as zones of economic activity in the region;
- creation of internal structures within the cluster i.e. dividing companies according to their specific production or activity, which favors more frequent meetings, discussions about common matters and problems and transfer of results to the cluster forum;
- limited acceptance of new members (requirements for potential cluster members) and thanks to that, selecting companies with high potential, oriented on niche attractive products;
- presence of dedicated, enthusiastic members who actively participate in cluster activities and thus drive further cluster development;
- effective application for financial support from the government and/or EU sources which stimulates cluster activities, and enables to enhance cluster cooperation into international level;
- broad international cooperation, participation in realization of international projects;
- extensive cluster-to-cluster cooperation (e.g. clusters within the same region or the same industry area).

In general, clusters try to create such conditions which would favor not only their own progress but also comprehensive economic development of the region in which they operate. Therefore, they underline as crucial joining education sphere with business sphere and cooperation with government authorities and public administration entities, research and education units within the scope of creation of conditions favorable for economic activity for businesses.

Clusters also highlight the great importance of good leadership (the management group) in the cluster with the ability to listen to the entrepreneurs' needs, to be open for their suggestions and ideas, and with charisma and enthusiasm in action. The leadership must be one which is creative and which offers comprehensive forms of activity for cluster members and participants. Another factor with significance on cluster's growth is the conducive location in the area rich in traditions and a long history of particular sector in the region in which cluster operates.

E. Problems encountered in cluster development in Poland according to the sample

Unfortunately, clusters face many difficulties hampering their development in Polish conditions. Due to the short history of a cluster concept in the country and limited experience, many imperfections appear. Clusters pinpoint the following problems encountered:

- ignorance and unawareness of many authorities on what

- clusters really are and what is their purpose of existence,
- impossible or very difficult to fulfill requirements in regards to obtaining subsidies, financial support from government and EU sources,
 - lack of financial support on regional (local) level,
 - lack of relevant legislation,
 - bureaucratic impediments,
 - often changes in requirements necessary for applying for financial support from external sources, regulations difficult to understand,
 - ignorance of the clusters' needs from authorities side, incompetence or inability to listen,
 - wrong adjustment of funding instruments to the real needs of clusters and their members (impossibility or limits in investing in certain investments e.g. building own infrastructure of the cluster, financing the wages of people engaged in the project realization etc.),
 - sector mistrust, lack of professional courage and conservative attitude (mentality) of entrepreneurs,
 - reluctance and fear of small enterprises from sharing internal data and becoming dependent from other bigger company.

Clusters wish to improve the public-private dialog as it has a crucial meaning in many areas. Nevertheless, the role of support of public authorities depends on a model of policy leading towards clusters in the country. Therefore, it is vital to set up a strong regulatory framework for public-private partnership in which the private side should be a leader and the public side should play the role of a catalyst for development. It is also important to develop (through promotion of clustering idea) an awareness of entities (both authorities and enterprises) on a wider scale in order to change the often-incorrect perception about the concept of clusters. Besides, as well-financed clusters are able to grow faster and achieve more ambitious goals thus contributing to successful development of industry and region they operate in; an offer of various programs and initiatives both on EU and national level in Poland is vital and plays a crucial role in cluster concept development. Nevertheless, due to the fact that the Polish policy towards clusters is not transparent thus may hamper effective use of what it offers. Because it draws on various already existing policies such as education, innovation, scientific and other policies, the sources of financing different activities significant for cluster development are scattered. Cluster managers very often indicate a difficulty in obtaining financial support even though there are numerous projects and initiatives offered by EU and Polish government. They stressed on a lack of comprehensive approach, strategy towards cluster support in Poland. Problem concerns to the fact that projects or programs designed for clusters' support often fail to match with real clusters' expectations and the level of support offered is not adapted to the level of cluster organization in the country (disparity in programs' purposes and stage of clusters development). That is why, it is vital for cluster-based policy and financial support actions to be

compatible to one another and provide real possibilities for further development of cluster concept in Poland.

V. CONCLUSION

Popularity of the clustering idea on an international scale raised great interest among Polish enterprises, which started to consider cooperation within a cluster as a way for further successful development. Cluster concept development in Poland started to develop rapidly during the last decade with more and more clusters and cluster initiatives emerging every year. However, due to the comparatively young history of its existence both clusters and a cluster based policy in the country characterize limited experience in action.

This research allowed to distinguish characteristic features of Polish clusters and good practices, which can be implemented on a further scale in the future. Specification of the problems encountered, on the contrary, put attention on existing imperfections that have to be taken into consideration in order to enable an improvement of conditions for clusters development in the country.

ACKNOWLEDGMENT

Authors are thankful to the International Visegrad Fund No. 51000656 and the Internal Grant Agency of FaME TBU No. DP 9/10 for financial support to carry out this research.

REFERENCES

- [1] A. Marshall, *Principles of Economics*. 8th ed. London: Macmillan, 1920.
- [2] T. Anderson, A. Schwaag-Serger, J. Sörvik, and E. Hannson, *The Cluster Policies Whitebook*. IKED – International Organization for Knowledge Economy and Enterprise Development, Sweden, 2004.
- [3] U. Blien, and G. Maier, *The Economics of Regional Clusters. Networks, Technology and Policy*. UK: Edward Elgar Publishing Limited, 2008.
- [4] European Commission FP7. Available from: http://cordis.europa.eu/fp7/capacities/regions-knowledge_en.html.
- [5] H.-D. Evers, *Knowledge hubs and knowledge clusters: Designing a knowledge architecture for development*. Centre for Development Research (ZEF), University of Bonn, 2008. Available from: <http://mpr.ub.uni-muenchen.de/8778/>.
- [6] Ö. Sölvell, G. Lindqvist, and C. Ketels, *The Cluster Initiative Greenbook*. Stockholm: Ivory Tower AB, 2003.
- [7] V. Leopoulosi, K. Kirytopoulosi, D. Voulgaridou, "SWOT analysis in supply chain clustering", Proceedings of the 11th WSEAS International Conference on SYSTEMS, Agios Nikolaos, Crete Island, Greece, July 23-25, 2007, pp.110-115.
- [8] C. Ianca, G. Batrinca, "Towards a Romanian Maritime Cluster", Proceedings of the 3rd WSEAS International Conference on Maritime and Naval Science and Engineering, Constantza, Romania, September 3-5, 2010, pp.94-99.
- [9] M.E. Porter, *The Competitive Advantage of Nations*. New York: Free Press, 1990.
- [10] S. A. Rosenfeld, "Bringing Business Clusters into the Mainstream of Economic Development", *European Planning Studies*, Vol. 5, No. 1, 1997.
- [11] OECD, *Boosting innovation. The Cluster Approach*. Paris: OECD Publishing, 1999.
- [12] L. Mytelka, and F. Farinelli, *Local Clusters, Innovation Systems and Sustained Competitiveness*. The United Nations University. Discussion Paper Series. 2000. [Online]. Available from: <http://www.intech.unu.edu/publications/discussion-papers/2000-5.pdf>.
- [13] P. Cooke, *Knowledge Economies: Clusters, Learning and Cooperative Advantage*. London: Routledge, 2002.

- [14] M. J. Enright, "Regional Clusters: What We Know and What We Should Know," In: Bröcker, J., Dohse, D., Soltwedel, R. (eds.) *Innovation Clusters and Interregional Competition*. Berlin: Springer-Verlag, 2003. pp. 99–129.
- [15] A. Gryczuk, "Koncepcja grup w teorii i praktyce zarządzania (The concept of clusters in theory and practice of management)," *Organizacja i Kierowanie*, Vol. 3 (113), 2003, pp. 3-16.
- [16] A. Groznik, "E-logistics: Slovenian Transport Logistics Cluster creation," *WSEAS Transactions on Information Science & Applications*, Vol. 5, Iss. 4, 2008, pp.375-384.
- [17] M.E. Porter, "Clusters and the new economics of competition," *Harvard Business Review*. Nov/Dec 1998, Vol. 76, Iss. 6, p.78.
- [18] M.E. Porter, *On Competition*. Updated and Expanded Edition. Boston: Harvard Business School Publishing, 2008.
- [19] J. Stejskal, "Comparison of Often Applied Methods for Industrial Cluster Identification", Proceedings of the 10th WSEAS International Conference on Development, Energy, Environment, Economics (DEEE '10), Puerto De La Cruz, Tenerife, November 30-December 2, 2010, pp. 282-286.
- [20] E. J. Feser, E. M. Bergmann, National Industry Cluster Templates: A Framework for Applied Regional Cluster Analysis, *Regional Studies*, Vol. 34, No. 1, 2000.
- [21] Ö. Sölvell, *Clusters. Balancing Evolutionary and Constructive Forces*. Second edition. Sweden: Ivory Tower, 2009.
- [22] D. Pavelková, L.Friedel, E. Jirčiková, A. Knápková, K. Skokan, and P. Škodáková, *Klastry a jejich vliv na výkonost firem (Clusters and their influence on the performance of firms)*. Prague: GRADA; 2009.
- [23] C. Hendry, J. Brown, and R. Defillippi, "Regional clustering of high technology-based firms: opto-electronics in three countries", *Regional studies*, Vol. 34, Iss. 2, 2000, pp. 129-144.
- [24] M. Gorynia, and B. Jankowska, *Klastry a międzynarodowa konkurencyjność i internacjonalizacja przedsiębiorstwa (Clusters and international competitiveness and internationalization of enterprise)*. Warszawa: Difin, 2008.
- [25] European Commission, *Final report of the Expert Group on Enterprise Clusters and Networks*. European Commission, Belgium, 2005.
- [26] www.klastry-efs.pl
- [27] S. Kosińska, *Country Report: Poland. 2007*. [Online]. Available from: <http://www.clusterobservatory.eu/index.php?id=42&nid=>.
- [28] www.proinno-europe.eu
- [29] Ministerstwo Rozwoju Regionalnego. *Program Operacyjny Innowacyjna Gospodarka, 2007-2013. Narodowe Strategiczne Ramy Odniesienia 2007-2013. (Operational Program Innovative Economy 2007-2013. National Strategic Reference Framework 2007-2013)*. [Online]. Available from: http://www.pois.gov.pl/Dokumenty/Lists/Dokumenty%20programowe/Attachments/89/POIG_01102008.pdf.
- [30] K. Gulda, "Klastry jako szansa dla przedsiębiorczości (Clusters as an opportunity for entrepreneurship)," In: Dzierzanowski, M., Szultka, S. *Wspieranie rozwoju klastrów w Polsce i zagranicą – doświadczenia i wyzwania (Support for cluster development in Poland and abroad - experiences and challenges)*. Gdańsk: IBnGR, 2008, pp. 8-9.
- [31] S. Szultka, "Polityka wspierania klastrów w Polsce – doświadczenia, ocena i wnioski na przyszłość. (Cluster policy in Poland - experiences, evaluation and lessons to be learned)," In: Dzierzanowski, M., Szultka, S. *Wspieranie rozwoju klastrów w Polsce i zagranicą – doświadczenia i wyzwania (Support for cluster development in Poland and abroad - experiences and challenges)*. Gdańsk: IBnGR, 2008, pp. 12-15.
- [32] www.pi.gov.pl
- [33] Innovating Regions in Europe. *IRE subgroup on Regional clustering and networking as innovation drivers: Cluster Management (Learning module 5)*. [Online]. Available from: www.innovating-regions.org.
- [34] CLOE – Clusters Linked Over Europe. *Cluster Management Guide – Guidelines for the Development and Management of Cluster Initiatives*. 2006. [Online]. Available from: <http://www.clusterforum.org/>.