
INDUSTRIAL CLUSTERS IN SLOVENIA – A SUCCESS STORY?

■ **Abstract:**

Slovenia has begun with its national cluster policy in 2001. Industrial clusters have been a prevalent element of Slovenian competitiveness policy for next four years. More than thirty cluster initiatives were born in Slovenia in that period. The authors of this paper have followed the birth, organization and performance of industrial clusters in Slovenia for the period of three years. Based on several in-depth case studies in Slovenia and Austria we have built a cluster development and organization model applicable to smaller (transitional) countries. We have identified factors that have an impact on cluster development and organization at the level of general business environment. At the same time we have identified a government role in fostering clusters. But external factors are not the only factors influencing clusters. There are also internal factors that are in the hands of the cluster actors. These are factors that directly influence cluster development and organization process. We have classified them in four areas and they will be also presented in this paper. We have also identified four stages of cluster birth, organization and growth. The model is highly applicable as it combines research results with best practices based on several case studies.

■ **Keywords:**

cluster development, cluster model, cluster organization, industrial clusters, Slovenia

■ **INTRODUCTION – ON INDUSTRIAL CLUSTERS**

Various terms and definitions have been used to describe the phenomenon of agglomerations of interlinked firms. [1] provided a solid definition of the term “clusters” that embraces most important elements:

“Clusters are agglomerations of firms in a particular activity, usually with geographical dimension, with horizontal and (preferably also) vertical intra- and (preferably) inter-sectorial linkages in the context of facilitatory socio-institutional setting, which cooperate and compete in (inter)national markets.”

Clusters of high-technology firms have become an important source of economic development across the advanced industrial economies, and a central focus of technology policy. Many research studies have provided descriptions of successful technology clusters and the existence

of social networks, labor mobility and knowledge availability have been identified as crucial components that make technology clusters relevant for wider technology policy [2]. Although the cluster concept is quite widely recognized today, it is still just a concept rather than being supported by a well-defined body of knowledge. There is a need for research to put flesh onto the concept and establish operating principles and guidelines. There are many open questions concerning the creation and nature of clusters and concerning the operations management of clusters [3].

Hundreds of cluster initiatives have been launched involving virtually all regions in the world and the number is still growing. However, there is surprisingly little systematic knowledge of these initiatives, their structures and their

outcomes. This is a gap in the world literature that should be filled.

This paper presents the cluster policy in Slovenia. The main contribution, however, is a proposed model of cluster development, organisation and growth, especially applicable for smaller, even transition countries.

■ INDUSTRIAL CLUSTERS IN SLOVENIA

The Slovenian Ministry of Economics started the clustering concept in 2001, as the ministry recognized both the value of industry clusters and the need for greater innovation and networking among Slovenian manufacturers. Quickly industrial clusters became a part of the Programme of measures for fostering entrepreneurship and competitiveness. In 1999 three pilot projects were launched: Toolmakers Cluster of Slovenia (TCS), Slovenian Automotive Cluster (ACS) and Slovenian Transportation-logistic cluster. Since then the number of clusters has been continuously rising. It reached a number around thirty clusters that were successfully operating in Slovenia in the field of automotive industry, tool making industry, transportation, logistics, air conditioning, building construction, plastics, ecology, textile, wood, tourism, catering, hotels, geodesy etc. In the observed period of research (from 2001-2005) the cluster policy presented a pillar of Slovenian Government's industrial policy.

The Slovenian Ministry of Economics spent almost 9 million Euros for establishing and supporting 29 clusters in Slovenia in the period from 2001 until 2004. Majority of the funds was for cluster organizational issues (establishing legal form, promotional activities, joint infrastructure etc.). The analysis of cluster policy measures from 2001-2004 proved positive effects on local economy. The Slovenian Ministry of Economy developed a systematic framework for developing industry clusters and soon it has been widely recognized that cluster policy in Slovenia was among the best in developing countries. It was constantly used as a case study in different publications and presentations (e. g. [4]). In 2006 TCS was named as one of the most innovative cluster in Europe (by EU IRE – Innovative regions). The manager of ACS was recognized as the best cluster-manager in Europe in 2006 by the Europe INNOVA initiative. Despite all that, in 2005 a new government stopped direct funding of clusters. That was a

huge barrier for younger clusters. Many of these clusters lost their starting enthusiasm and simply disappeared. Older and more established clusters continued to exist, but also faced many unexpected problems. Many joint projects were endangered, especially R&D projects. Clusters had to find additional funding elsewhere. Majority of smaller cluster disappeared. The original clusters, namely TCS and ACS still exist and operate. The government did not support cluster R&D projects in preference to other R&D projects. In the period from 2005 to 2009 cluster policy was not the important part of national policy to foster competitiveness and entrepreneurship of Slovenia. Nevertheless, the importance of clusters in neighboring regions continues to grow.

■ RESEARCH METHODOLOGY

The focus of our research was developing a cluster model in smaller transitional countries. The research has adopted a case study methodology [5] with a significant element of action research [6].

A case study research strategy enabled us to focus on understanding the dynamics of the phenomenon observed. The case study methodology is appropriate when the boundaries between phenomenon and context are not clearly evident. The case study's purpose may be strictly to describe a situation but, more often, it is to understand how or why events occur [7]. We attempted to study a particular process of cluster birth, development, organization and growth and grasp the conditions surrounding the phenomenon to build a plausible explanation or discover a causal relationship that links the antecedents to the result. [48] also argues that case study is an objective, in-depth examination of contemporary phenomenon where the investigator has little control over events. This definition covers several significant points. First, the study typically involves one or more researchers gathering a considerable volume of data from within an organization to develop the clearest possible picture of the phenomenon. The data may come from primary sources (such as direct observation or interviews of people involved). It may examine a single situation or, with multiple-case studies, several related situations. Second, distinct from historical studies, case study research generally focuses on

current conditions, using historical data primarily to understand or substantiate the information gathered about the ongoing situation. Third, the researcher usually has little or no capability of manipulating events (in contrast to action research, where the researcher is involved as a participant and director of events in a natural setting).

Let us take a look how all these points were integrated in our research. The data was gathered in real business environment in specific firms and other organizations. Most of the data was qualitative, but in order to interpret the results additional quantitative data was also used. The authors have used primary and secondary data sources. Direct observations of the events were possible because of the active participation in TCS. The first author had a chance to participate in business meetings. He has also been involved in preparing and managing several TCS projects (e. g. building database of existing and future knowledge and technologies, arranging and conducting business meetings with potential business partners). Active participation in TCS has enabled to gather data that otherwise would not be available. This especially refers to data, gathered through informal contacts with top managers in TCS. The next primary source was interviews with top managers of firms and other relevant informants. The interviews normally lasted 2 hours. They were tape recorded and transcribed in the hours immediately following the interviews.

The secondary sources were documents, sometimes even classified documents (minutes and notes from meetings, business documentation, reports, newsletters, etc). The first author also kept a diary of relevant events that happened in the period of four years. He also made notes, observations, impressions, ideas and analyzed them accordingly. The use of different data sources improves the validity of the proposed models.

Three case studies have been selected (industrial clusters) that served as a way for data gathering. The most important case study is TCS that has been the most detailed case study and at the same time a place to conduct action research. Two other case studies were ACS and Automotive cluster of Austria (AC Styria) to deepen our understanding of researched phenomenon.

Action research element was extremely important to grasp the dynamics of cooperative activities between members of studied cluster. The first author of this paper was heavily involved in activities of TCS. For example he prepared a catalogue of technologies and knowledge within TCS. This catalogue was also a basis for understanding the relationships between firms with respect to technologies and knowledge. It was a starting point to build technology network. This enabled him to be part of initiated actions and also reflecting on consequences by developing knowledge informative to theory building. The research has focused on current situation in the cluster. Historical events were helping to understand the current situation.

■ **CLUSTER DEVELOPMENT & ORGANISATION MODEL**
 ■ **Cluster model**

Based on intense studying of theoretical perspectives, domestic and foreign best practices and especially on the research conducted with the appropriate research methodology (case study and action research) we have prepared a model of cluster development and organization process. This model also includes practical experiences with TCS, ACS and AC Styria. Building the cluster development and organization model was the first part; the second part was the identification of factors influencing cluster development and organization process. We have classified the cluster development and organization process into four stages:

- Cluster initiative – local economy analysis, governmental approach to cluster;
- Cluster definition – the mapping of cluster, cluster definition, setting the leading team, setting a cluster vision, looking for partners, membership analysis, strategic cluster development plan, cluster development structure, cluster project organization;
- Cluster development – short-term plans, building trust and networking, cluster informatisation, education and training, cluster promotion, technological development strategy;
- Cluster growth and technological development – internationalization strategy, cluster restructuring, cluster monitoring.

Cluster initiative stage encompasses the analysis of local and national business environment. Basic characteristics of business environment

have to be identified in order to find out the potential for new clusters formation. In this initial phase a governmental role is very important. Government must promote the cluster concept in the region (bottom-up or top-down approach) and help cluster initiatives with advice.

Cluster definition stage comprises several activities, such as cluster mapping, definition of cluster context, setting the leading team, setting the cluster vision, looking for partners, membership analysis, formation of strategic development plan, cluster development structure, cluster project organization. In this stage is important to define cluster context, its core business and members, vision and top management.

After the definition of a cluster it is important that the cluster starts to develop immediately. The starting enthusiasm of the cluster members and particularly cluster top management must be transformed into action. Cluster development stage comprises several activities that differ from one cluster to another. Some of them should be present in each cluster: formation of short-term plans, building trust and networking, cluster informatisation, education and training, cluster promotion and technological development strategy.

The last stage is cluster growth and technological development. Cluster growth is associated with cluster physical growth and cluster competitiveness growth. Physical growth means acquiring new members, growth of existing members, linkages with other networks and clusters, new suppliers, new buyers etc. Clusters have great impact on productivity, innovation activities and formation of new businesses and all of these factors contribute to competitiveness growth of a cluster. At the same time competitiveness depends on new technologies and knowledge – cluster technological development. In this stage clusters go through internationalization activities and organizational restructuring. It is also important that all activities are monitored.

■ Cluster development and organisation factors

The clusters are at least in their core a part of a national environment. This environment, in which clusters are born and developed, consists of four levels: general business environment,

governmental cluster policy, microeconomic business environment (embedded in Porter's diamond model) and clusters. General business environment of the nation consists further of five pillars: national history and culture, geographical position, legal framework and institutions, macroeconomic environment and infrastructure. We will take a look at each of them more in detail. These characteristics of business environment must be taken into account when we start with cluster initiatives.

The factors that have an impact on cluster development and organization at the level of general business environment are:

1. National history and culture (level of development of market economy, level of experience in competition and cooperation between firms, level of cooperation between industry and R&D institutions, level of firms' acquaintance, level of trust between firms, level of trust in governmental organizations, level of impact of governmental policy in economy, existence of organizations to foster cooperation between private and public sector or to serve as a »glue« in society, social capital in overall society, entrepreneurship climate and culture).
2. Geographical position (physical position with infrastructure, natural resources, closeness of countries with developed clusters, geographical closeness of markets and customers).
3. The legal framework and institutions (governmental institutions, institutions for cooperation, educational system, intellectual property rights, environmental legal framework, jurisdiction, regional policy).
4. Macroeconomics with its goals (a favorable currency exchange, a low inflation rate, a positive balance, appropriate employment rate, a favorable fiscal policy (taxes), monetary policy, a foreign economic policy).
5. Infrastructure (local schools, universities, local trading associations, economic development agencies, regional agencies, technology centers, technology parks, business incubators with researchers, roads, railways, ports and airports, garbage disposal, communication linkages).

The second level is governmental cluster policy. The government has the following roles in dealing with industrial clusters:

- initiator (public calls, cluster policy),

- *catalyst (new ideas),*
- *financier (at the beginning of the cluster formation, R&D projects),*
- *stimulator (of all actors in local economy to upgrade business environment, to set local vision),*
- *adviser (expert help with cluster development and organization in initial stage),*
- *linkage (between private and public sector, governmental institutions firms – forums),*
- *caretaker (of favorable business environment, macroeconomic and political stability),*
- *doctor (removing gaps and errors in business environment),*
- *guardian (competitiveness policy, intellectual property rights, legal framework),*
- *tutor and mentor (training cluster managers),*
- *promoter (of the cluster concept home and abroad, new investors, new capital),*
- *agent (for knowledge exchange, R&D),*
- *buyer,*
- *informant (foresight studies, trends),*
- *constructor (infrastructure, physical supporting environment).*

The third level is a step from macro level to micro level, described in Porter's diamond model. This model is used to illustrate the quality of regional business environment and regional productivity. Its four determinants (context for firm strategy and rivalry; factor (input) conditions; demand conditions; related and supporting industries) lead to the occurrence of interdependent competitive sectors in economy – industrial clusters. The cluster development and organization process have already been presented. The micro level ends with a firm, as a central building-block of clusters and national economies.

External factors are coming from cluster business environment and the cluster does not have any impact on them in the beginning. The cluster can influence some of these factors later, when it is formed, developed and a powerful actor in regional and national economy (e.g. lobbying). The clusters can have an impact on legal framework and institutions, infrastructure as well as on future governmental cluster policy. With their business results the clusters can indirectly influence macroeconomics trends (the only condition is a sufficient critical mass of involved actors and many interdependent clusters).

But external factors are not the only factors influencing clusters. There are also internal factors that are in the hands of the cluster actors. These are factors that directly influence the cluster development and organization process. We have classified them in four areas: cluster size and structure; cluster members' enthusiasm; cluster members' leadership capabilities and organizational approaches. Let us have a closer look at each of these areas.

The cluster size and structure that primarily influences cluster organization:

- *Critical mass – the cluster birth is reasonable only if there is enough firms and other organizations;*
- *The size – the higher number of members means more problems with organizational issues and with achieving consensus on what actions to perform. Large clusters are definitely preferable after overcoming these initial organizational problems. This is why it is recommended for a cluster to have just a core of actors at the beginning. This cluster core sets the rules of the game;*
- *SMEs and large firms ratio – there is a place for each and every type and size of firms in a cluster;*
- *Vertical and horizontal relationships ratio in the cluster – each dimension brings different relationships between cluster firms and different means of cooperation and cluster organization;*
- *Presence of leading regional and national firms – these firms have a direct impact on attracting new members and different cluster organization (establishment of internal networks and value chains around these firms);*
- *Geographical diffusion and focus – greater geographical proximity means easier organization;*
- *Structural gaps – identification of gaps in value chains influences the cluster organization (attracting new missing links, outsourcing specific activities).*

Cluster members' enthusiasm primarily influences the:

- *Visionaries – setting the common cluster vision, foreseeing cluster future, setting cluster core competence;*
- *Members' consensus – defined consensus on what actions to perform, common goals, common strategies, help with individual*

cluster members' goals, cooperation on common areas of interest;

- Willingness to cooperate and to network – the firms must start opening themselves, look for business partners and business opportunities;
- Firms' activity – only active and risk taking firms contribute to cluster development;
- Energy and enthusiasm of cluster members – a driver for cluster development;
- Understanding the essence of cluster and clustering process – this understanding has a direct impact on long-term cluster development process.

Leadership capabilities:

- Leadership team – skills to manage network organizations and all the qualities we have mentioned at cluster members' enthusiasm;
- Cluster manager – with all characteristics a good leader must possess;
- Consultancy help – if there is not enough knowledge for cluster development and organization or to ensure neutrality;
- Equality for all cluster members – the feeling of inequality never contributes to cluster development.

Organizational approaches in cluster:

- Formal organization with its linking centre;
- The use of information and communication technology to connect all cluster members;
- Project management – cluster project organization;
- Flexible organizational forms – simple organizational adjustments must be possible with cluster growth and new challenges;
- Monitoring – periodic cluster performance control (figure 1).

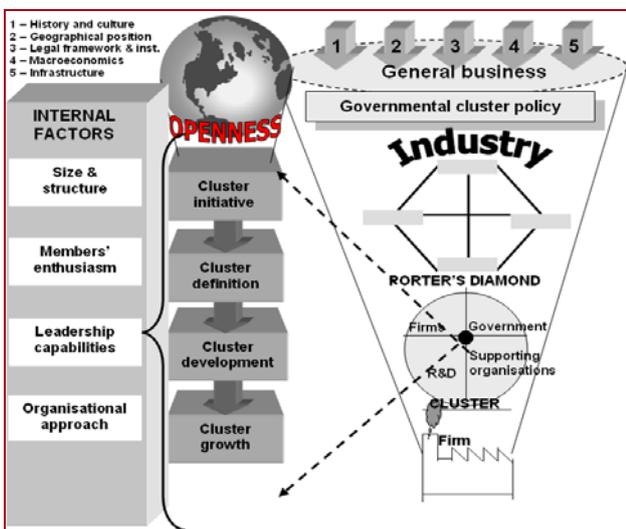


Figure 1. A cluster development and organization model

CONCLUSION

Recent development of industrial clusters shows that it is not enough for clusters to be locally strong. On the contrary, they must tend to be globally strong and dynamic (local dynamism, global attractiveness, global market reach). A strong cluster core with local actors must become a part of international – global business environment and accept foreign influence. With one word, cluster must be open, which means:

- clusters must allow the entrance of new domestic firms and other organizations,
- clusters must welcome also the firms that do not seem to fit in the cluster,
- competition must be welcomed and not persecuted,
- cluster must welcome foreign firms and other organizations,
- cluster must attract foreign direct investments,
- cluster must attract as many as possible different financial resources from public and in particularly private sector,
- no monopoly, cartels and trusts,
- no trading limitations,
- no competitiveness protection by the government,
- cooperation with other domestic clusters,
- cooperation with foreign clusters from the same (similar) or different industries,
- cooperation with foreign multi-national firms and other firms and R&D institutions,
- more communication between firms and between firms and other organizations,
- comparison with other domestic and foreign clusters – benchmarking,
- continuous promotion and building of globally recognized cluster trade mark.

On the final note – are clusters a success story in Slovenia? Although they are not as popular as five years ago they were one of the main reasons that Slovenian firms started to cooperate more openly. A good combination of “top-down” and “bottom-up” approach of the clustering policy made this possible. A new network forms have developed since then, such as technological platforms, living labs etc. A recent study (in 2006 and 2009) performed by the first author of this paper among manufacturing firms in Slovenia provided extremely interesting results. In comparison with several European countries Slovenian manufacturing firms were the ones that had the higher percentage of cooperation

with other firms and R&D institutions. Surprisingly, or not, a part of this fact can be explained by the clustering policy in the first half of past decade.

■ **REFERENCES**

- [1.] PITELIS C.N. Cluster diagnosis, paper presented at Netwin project in London, 2001.
- [2.] CASPER S. How do technology clusters emerge and become sustainable? Social network formation and inter-firm mobility within the San Diego biotechnology cluster. *Research Policy* 2007; vol. 36, 438–455.
- [3.] CARRIE A. S. Integrated clusters – the future basis of competition. *International Journal of Agile Management Systems* 1999; vol.1, no. 1, 45-50.
- [4.] SÖLVELL Ö, LINDQVIST G., KETELS C., PORTER M. *The Cluster Initiative Greenbook*. Stockholm: Ivory Tower AB, 2003.
- [5.] EISENHARD K. M. Building theories from case study research. *Academy of Management Review* 1989; vol. 14, no. 4, 532-550.
- [6.] COUGHLAN P., COUGHLAN D. Action research for operations management. *International Journal of Operations & Productions Management* 2002; vol. 22, no. 2, 220–240.
- [7.] YIN R. K. *Case Study Research: Design and Methods*. London: Sage Publications, 1989

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**ACTA TECHNICA CORVINIENSIS
– BULLETIN of ENGINEERING**

ISSN: 2067-3809 [CD-Rom, online]

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**ANNALS
of
FACULTY ENGINEERING HUNEDOARA
– INTERNATIONAL
JOURNAL of ENGINEERING**

ISSN: 1584-2665 [print, online]

ISSN: 1584-2673 [CD-Rom, online]

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