

## International Innovative Clusters – The Growth of Regional Competitiveness

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### Abstract

*The dynamics of clusters is an extremely complex process and is more visible in the regions where innovation and economic growth creates a favorable climate for collaboration and specialization, and also for competition in achieving outstanding performance. Romanian cluster policy was from the beginning until now, a part of industrial policy, neglecting non-industrial clusters with key role in the development of some intelligent services for economic growth and population welfare. Currently, Romania has successful clusters in various economic sectors and services: auto, wood industry, garment industry, agro-food industry, tourism, health and medical sciences, renewable energy, essential generic technologies (KET), creative and cultural sectors, construction, information and communications technology, naval and logistics. The partnership with EU Member States, with regions, with cities and with private sector is essential in the next process of industrial modernization, based on innovation. The study shows the role of innovative clusters in economic development at European and national level and cluster policies, which can be defined as specific government efforts to support clusters.*

**Key words:** clusters, innovations, competitiveness, regional development

**J.E.L. classification:** O25, O30, O40, R11, R38

### 1. Introduction

The vector of development of regional economic systems determines modernization of an economy. Priority, here, is given to the principle of organizing a territory by clusters. There is a widespread expansion of organizational forms of inter-firm cooperation aimed at building closer links between firms and their suppliers and customers, as well as knowledge institutions engaged in innovation. The main feature of the information society, which is described in detail by Manuel Castells, 2000 is not so much the domination of information as the network logic of its use, which gives the disseminated information special qualities and functions. Therefore, the transition to a model of an innovative regional cluster and more sustainable development begins with the formation of an innovative person. This challenge will require many nations to conduct reforms that could let go of the familiar concept of "human capital" and to make an innovative person a partner on an equal footing with the other players, especially the science and business.

According to the neoclassical tradition, a necessary condition for the cluster definition is identification of stable interactions between economic agents. We are talking about the work of A. Marshall entitled "Principles of economics", which shows that industrial regions that host several companies engaged in related activities, are characterized by high levels of economic development. In the 2000s, the concept of an innovative regional cluster penetrated economies of developed countries (from Scandinavia to Japan) as a basis of the development of an innovative person. It also started to appear in decisions of the Baltic Development Forum and strategic documents of the EU as a new approach to the processes of integration and creation of a single knowledge market.

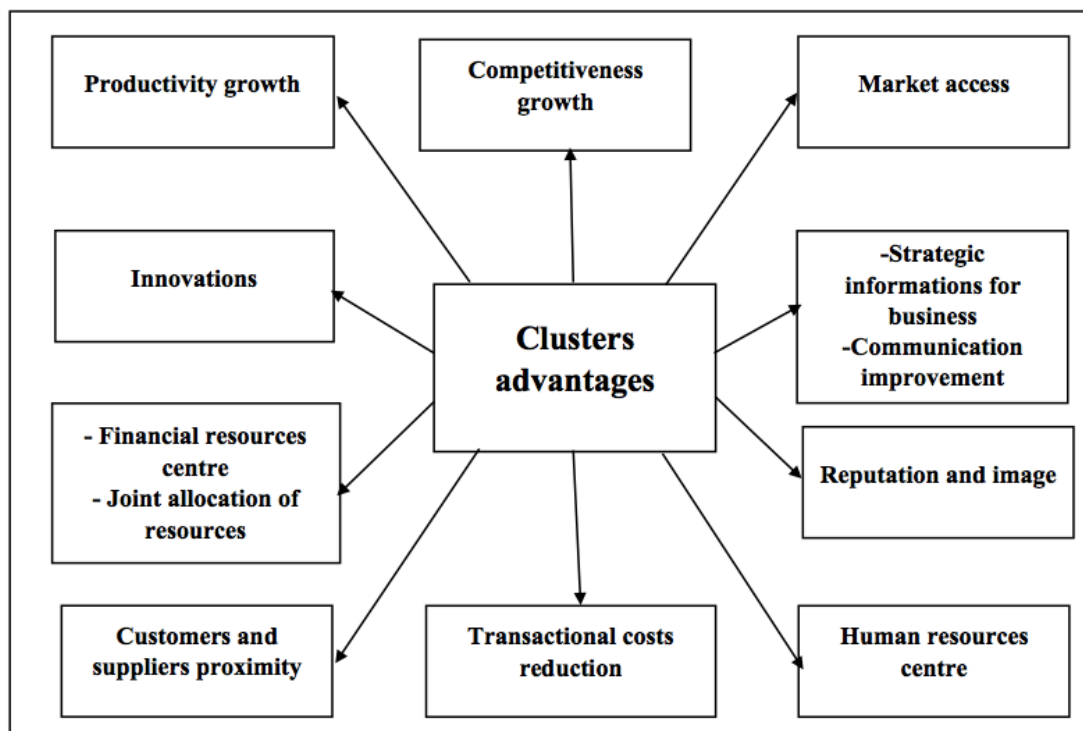
According to Michael Porter's definition: "*Clusters represent geographical concentrations of interconnected companies and institutions, which manifest themselves in a certain field of activity. Clusters contain a group of related industries and other important organizational entities from*

competition point of view. These include, for example, suppliers of specialized inputs such as components, machines and services, or suppliers of specialized infrastructure. Clusters often expand downstream to various distribution channels and customers and laterally to manufacturers of complementary products and to industries related through common qualifications, technologies or inputs. (Porter M., 1998). Inside the clusters, can be found government bodies or universities, vocational training providers and employers who provide specialized training, education, information, research and technical support" (Porter 1999). There are two key elements in Porter's definition. Firstly, the focus is on the interconnections between the actors and the resulting positive externalities (for ex: skilled labour force, available locally, low transport costs, external economies of scale, transfer of know- how etc.), elements that make them fit into a cluster. The connections are both vertical (the chain of buyers and sellers), and horizontal (complementary products and services). The second fundamental feature is the geographical proximity of the group of companies within the cluster.

## 2. Theoretical background. The implications of clusters in regional development

The main theoretical tool used by Porter (2000, p.16), which explains the source of the local competitive advantage is "the diamond of competitiveness". The central part of the diamond is represented by the local context dynamics accentuated by the local competitiveness. The other strengths of this model are considered to be business rivalry, demand conditions, support industries and primary factors of production (local input). The interactions between the different components of the diamond are those that generate the competitive advantage of the cluster. According to this model, the role of local authorities is to contribute to the intensification of relations between factors. Porter distinguishes between policies that contribute to the expansion of the cluster (for example, the attraction of suppliers of goods or services in neighboring areas) and those that are focused on increasing the competitiveness of the cluster (for example, the creation of specialized educational programs ) (Figure 1).

Figure no. 1: Clusters advantages



Source: Tanțău (2011)

The economic benefits generated by clusters serve both cluster members and the public interest whereas efficiency, level of innovation and vocational training reach higher levels.

Clusters bring different actors together along the value chains and can speed up innovative interactions between technologies, economic sectors, regions and policy tools. *Economic theory emphasizes the evolution from policies for clusters to industrial policies through clusters. The implementation of the cluster concept and the cluster policy in the EU* has a remarkable tradition, due to the existence of programs that have supported cooperation between industry, academia, research and innovation. It is the case of France, Germany, Sweden, where it is not accidental the association of the term cluster, with competitiveness pole (France, Belgium, Portugal), industrial district / industrial agglomeration (Italy), networks of excellence / networks of competence (Germany), regional centres of technologies (Denmark), centres of expertise (Finland). At European Union level, there is a variety of clusters in terms of size, specialization, approach, governance, life cycle, labeling, etc. that represent the fundamental resource for elaboration and implementation of intelligent specialization strategies. Secondly, there is the category of regional clusters, whose importance may not exceed the borders of the region funded at the regional level. These also have a special impact on economic development and have the potential to reach the rank of top-level clusters. The main purpose of each cluster is to achieve economic performance. The performances of a cluster can be evaluated on the basis of three success factors: the competitiveness of the cluster, the growth of the cluster and the level of achievement of the set objectives.

To ensure that this resource can be used efficiently, decision factors from EU Member States have three types of actions to take: a) to use cluster mapping for identifying regional competences; b) to support clusters in achieving the objectives of intelligent specialization and c) to strengthen local/regional cooperation and cluster internationalization. *Cluster Mapping and Cluster Benchmarking* are valorous tools which can be used for identification of intelligence specialization models and for comparison of economic activities, in the context of internationalization and of competitiveness, to which clusters must successfully cope. **Cluster Mapping** provides regional sectorial and cross-sectorial data and visualizes the geographical concentration of cluster development in Europe. The strength of cluster development is shown by "cluster stars", which indicates the presence of a critical mass, according to cluster's size, the level of its specialization and how efficient it is. Along with over 20 regional indicators, cluster mapping provides a key tool for local competitiveness analysis. *Benchmarking* is a comparative analysis of structures, processes, goods and services, through which a cluster learns how to develop and improve its performance. Benchmarking is an efficient way to identify the potential of a cluster and to develop some strategic recommendations for short-term development. Benchmarking is a tool, which can be easily integrated, in a strategic management of a cluster.

The factors that influence the evolution and development of a cluster are the following: presence of specialized research centres; existence of a base of talented specialists; existence of specialized trainings; intensity of competitiveness between companies; level of cooperation between cluster's companies; expansion of related industries in and outside the cluster; special demand for cluster's goods and services; cluster specific regulations; existence of cluster specific collaboration institutions; cluster specific attitude towards the source of economic prosperity.

As noted, all these factors present a specialized feature, thus becoming a source of competitive advantage. The performances of clusters are determined by several factors such as: access to specialized human resources, access to specialized knowledge, entrepreneurship based on capitalization of opportunities, collaboration between organizations, specific public regulations of the cluster and specialized technologies.

The access to specialized human resources is one of the main factors which contributes to the achievement of decisive competitive advantage. In this sense, within the cluster, a series of specialized processes, generating performance are continuously developed: a continuous process of specialized human resources recruitment, which allows the identification of persons with special competences necessary for the innovation process, and therefore to obtain the innovative result of the cluster; the continuous instruction and specialized training of the employees, thus the cluster gets to have employees with general experience and also specialists in certain fields, which gives it a certain stability of the workforce and even a better delimitation of tasks; the cluster introduces a

new type of organizational culture that goes beyond the borders of the enterprise and is based on a series of values the most important of which is innovation.

As it turns out from Porter's argument, clusters have an impact on competition in terms of productivity, innovation and the emergence of a new business. Productivity is analysed

from the following perspectives: facilitation of the access to suppliers and work force, access to specialized information, complementarity of companies' activity, their close connection with local institutions, a better monitoring of their activity. All these have a particularly important role, considering that innovation involves real-time knowledge and the possibility of market trends anticipation, rapid response and flexibility in case of changes.

### 3. Good practices at European and national level

In the European Union, clusters have been spoken for almost two decades, as the new support structures for companies, among the main goals having competitiveness maintenance, through human resources improvement, innovation generation with the help of universities and creation/preservation of a business friendly environment, through the collaboration with administrations.

In Germany, the first efforts to support clusters were made in the mid-1990s. Federal states (Länder), such as Bavaria, Lower Saxony and North Rhine-Westphalia started to implement clusters within their borders. In 1996, "Bundesforschungsbericht" (Federal Research Report), for the first time officially included clusters as a way to support innovation. In Germany, cluster policy has its roots in the support of networks in the technological field and the regional development and it still emphasizes these areas today, through the support programme of excellence networks.

Table no. 1 Areas of innovation and competence networks in Germany

Agronomic and food sciences	Education	Biomimicry	Biotechnology	Energy techniques	Genomic research
IT	Air and space navigation technologies	Maritime technologies	Research on materials	Medicine	Medical technique
Mechatronics / microtechnology	Nanotechnologies	Optical technologies/ laser techniques	Production technologies	Transport	Environmental technologies

Source: "Bundesforschungsbericht" - Federal Research Report

The most important goals of these German competence networks are: research and industry networking, innovation and technology transfer (also inter-thematic), professional training and qualification, quality and benchmarking (comparative analysis). According to Table 1, there are targeted 18 fields of innovation. In conclusion, both, the sixteen provinces and the federal level, represented by the Ministry of Education and Research and the Ministry of Economy are the main actors in the policy of cluster support in Germany, in a rather complex constellation

Table no. 2 – Examples of cluster support programs in EU countries – Role of regional authorities and impact

Country	Program	Role of regional government(s)	Focus	Main results reported
FR	Local Production System (SPL)	Organize application Co-fund and coordinate	Engage actors Networking Found joint activities	Employment growth 9% versus 5.7% in equivalent sectors with no SPLs.
DE	BioRegio (4 advanced high-tech regions)	Organize application Co-fund and coordinate/implement	Strengthen existing biotechnology clusters Finance/R&D/ Collaboration/ Networking- Coordination/Business Support	Total in 4 regions: >300% increase in the number of biotech companies >9000 jobs Regions: Higher than national average increase in biotech jobs.

DE	InnoRegio (Lagging regions in East Germany)	Organize application Co-fund and coordinate/implement	Strengthen existing biotechnology clusters Finance/R&D/ Collaboration/ Networking- Coordination/Business Support	Higher level of R&D activity Than East Germany average
ES	Basque country Competitiveness Program	Initiate, finance, coordinate	Engage actors Develop cluster strategy Networking	Public/private collaboration, strategic cluster orientation Creation of various exports consortia and technology projects.

Source: OECD report on clusters

However, in only 4 cases was information reported on the performance of the clusters, and this concerned the total number of clusters. In general, it indicated positive outcomes in terms of job creation or boosted R&D activity.

In France, the policy of cluster support was adopted in 2004 and implemented since 2005, by launching a new type of industrial policy under the name "France, industrial power", in order to increase the competitiveness of the economy. The goal was to improve the innovation capacity, of the employment degree and of the continuous training of personnel. The rationality of adopting the intensive industrial development policy of the country lies in the fact that industry is the main economic sector of the country, which absorbs about 90% of research and development expenses and contributes 80% to the total exports. Therefore, France has huge development potential that needs to be harnessed at the highest level.

The new industrial policy was launched after the determination of spatial planning policy inefficiency, implemented almost fifty years ago in the 1960s, whose main objective was to reduce regional disparities by avoiding the concentration of industrial activities in some rich regions of the country and supporting declining regions.

A new support attempt of this policy was held in 1987 through the initiative of local production systems creation (systèmes productifs locaux) – SPL, which had modest effects in terms of productivity growth and, implicitly, the competitiveness of enterprises. SPL were mainly focused on production activities.

SPL support policy then targeted financial support by the state, of companies with modest results in terms of productivity and strengthening the collaboration of companies from the same economic field, located in a certain geographical area. It was not taking into consideration the cooperation with research centers, with training centers of labor force or other institutions. The amounts allocated by the state through the calls for projects were modest initially, under the value of 40,000 euro. However, SPL can be considered the precursors of today's competitiveness clusters and poles.

The new industrial policy launched in 2004 - 2005 aims to focus on research and development and the poles of competitiveness are the instruments to materialize this policy. The 103 SPLs existing in 2005 were evaluated and those with research and development orientation and with potential for internationalization of the activities received the name of competitiveness poles. Next year, based on establishing a more complex set of evaluation criteria the rating of competitiveness poles was received by a number of 67 clusters and in 2007 their number increased to 71. In 2017, competitiveness poles were reorganized, some of them merged so that their number dropped to 68.

Currently there are three categories of clusters in France, namely:

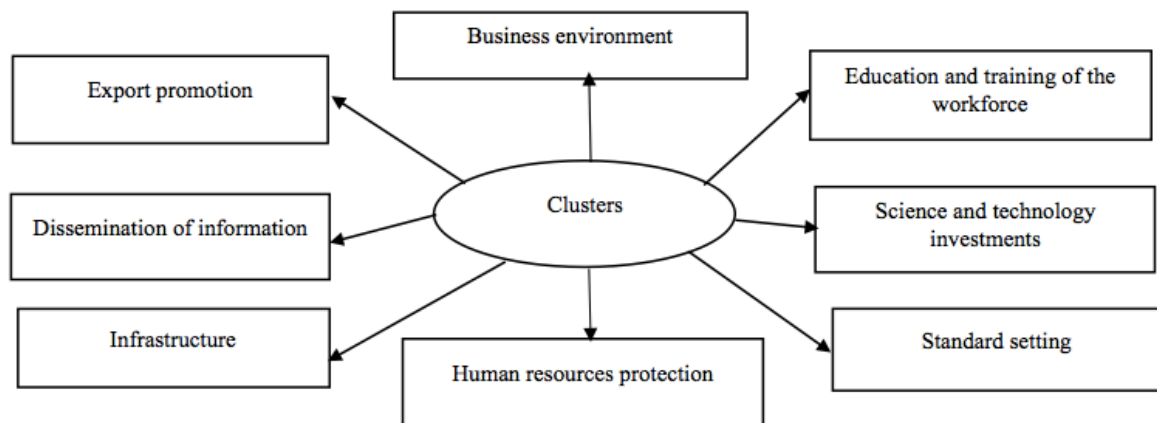
- A. Competitiveness poles;
- B. Business clusters (the so-called grappes d'entreprises);
- C. Regional clusters.

In Romania, clusters are a relatively new term, and in many areas they are not well known. On the other hand, we are talking about an evolution. About 20 years ago there was talk of business centers or chambers of commerce that had the role to catalyze the economic environment and to facilitate cooperation with universities, with local public administration. After that, 10-15 years ago there was a lot of talk about professional associations, also sectorial, on various fields of activity.

Cluj is rightly considered the capital of clusters because here are the only three clusters with the highest European certification, "Gold Label" from Romania. These are: AgroTransilvania Cluster, Cluster Mobilier Transilvan and Tech Transilvania Cluster. Only the time will tell whether clusters will succeed or not in maintaining their role as a catalyst or they will become digital innovation hubs. Transilvania IT Cluster created Transilvania Digital Innovation Hub, the only innovative digital hub in the North-West area of Romania, certified by the European Commission. These digital innovation hubs will represent the backbone around which all the financial support measures will be built from the programming period 2021-2027 on the Digital Europe and Horizon Europe program. Practically, the difference between cluster and digital innovation hub is as follows: when we are talking about an IT cluster, we are talking about companies in the IT area, of technology, which provides digitalization solutions, but in the digital innovation hubs we also include clusters from the other fields of activity, namely those economic actors which come with the demand for digitization solutions, the SMEs that need the services offered by IT clusters. In this regard, in Transilvania Digital Innovation Hub, were also included North Transylvania Cluster Consortium clusters: the cluster of agriculture, furniture, energy, and creative industries.

The Cluj model refers to openness and collaborative environment between clusters and the rest of the actors involved. Specifically, it's not about who gives the exact time, who is more beautiful or more important, but about when you can lead certain initiatives and when you can contribute only as part of the team. The experience of developed countries demonstrated that clustering processes serve as a foundation for constructive communication between the representatives of entrepreneurial sector and the state, educational and information environments, NGOs, etc.

Figure no. 2 Clusters and economic policy



Source: Scutaru (2018). Relansarea fluxurilor de investiții străine directe prin veriga clusterelor inovative, Editura PIM, Iași

The efficiency of the mutual relations from the innovation processes between the private sector, the state, trade associations, educational and research institutions, increased thanks to him.

As many other concentration at a world level, the Romanian cluster model has the following characteristics:

- ✓ Concentration (companies, localization in the region);
- ✓ Research and development units (research centers, universities);
- ✓ Labour force; here relevant are quality, quantity and the qualification of the labour force;
- ✓ Cooperation (current or planned projects, other types of cooperation);

The presence of a third party supplier of services (which provides services which are relevant for the cluster). The intensity of the above mentioned factors is different from cluster to cluster but as a general trend it is noticeable that as to the concentration of companies and labour force, the Romanian clusters are somewhat different as compared to the European ones, like the smaller number of members in a cluster and the existence of some catalyzing organizations (chambers of commerce, development agencies, local authorities) in the cluster (the model of the clover with a fourth leaf, mentioned for the first time by D. Cosnita in the analysis conducted by GTZ in Romania in 2010).



#### 4. Conclusions

In recent years, a lot of research has been carried out in Romania, with the purpose of identifying potential clusters and competitiveness poles, specialized in various fields of activity, which varies according to the geographical framework, natural resources existing in the area and, not least, the qualification of human resources, supported by the existence of large university centres.

The creation of clusters in Romania is in the process of development and Romanian clusters need a period of growth and maturation in which the trust and collaboration between their members would gain value and consistency. And yet, if we refer to indicators of business, innovation and international relations materialized in export values of the clusters which already exist in Romania we can anticipate that there are some of them that have the vocation to become competitiveness poles. We mention that in Romania there are sufficient areas that will give rise to genuine competitiveness poles that combine business excellence with such a demanding field and, at the same time, so necessary in nowadays economy, the field of research and innovation. Such areas as: ITC, renewable energy, automotive, electronics, health, biotechnologies, mechatronics, represents the future resources of the Romanian economy. Romania is still far from unlocking its creative and innovative potential, which creates real growth opportunities for RDI field in the future and the opportunity to become a genuine competitor on international markets.

#### 5. Acknowledgement

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