

Potential Links between Competitiveness of the Cluster-Type Economic Agglomerations and Systems of Innovation Process

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Abstract

The clusters, as economic development centers, are processes of in-time agglomerations of interconnected tradesmen/manufacturers in a certain geographic region. Clusters could be found in almost any historical period and regions. The belongings parts of those evolving clusters benefit from facilitated contacts, lower transaction costs, technological transfer, etc. It is generally acknowledged in the specialized literature that the new form of economic organization enables, since the beginning, the rising of the competitiveness and business efficiency of all participating companies. The way how those companies succeed to become competitive depends on strong industrial relationships on one way, and continuous technological development and modernization of technologies and products, on the other way. There was a strong connection between clusters development and the evolution of the models of innovation processes, especially in the developed industrial economies. Since now, are known five generations of models of innovation processes, that was evolving and developing hand on hand with the clusters evolution: i - "technology push"; ii - "market pull"; iii - "coupling"; iv – "functionally integrated models"; v – "system integrated models". The study is trying to identify the links between the ways of cluster development processes and the factors from models of innovation processes that really works and interacts in the potential cluster-type economic agglomerations found in the cross-border Region Maramures (RO)-Transcarpathia (UA), as a result of a cross-border project "RU-ECONdb-CLUS" (Maramures (RO)-Transcarpathia (UA)).

Key words: cluster competitiveness, innovation processes.

JEL Classification: C38, O00, O31.

1 Introduction

The topic of this research was carried out by the specialists from Technological Information Center of Technical University of Cluj Napoca – North University Center of Baia Mare as part of the efforts to adjust its research works to the needs of the potential cluster-type economic agglomerations found in the cross-border region formed by Maramures County in RO and Transcarpathia County in UA, as results of the project "RU-ECONdb-CLUS", Contract no: RO-2005/017-539.01.01.10, Neighbourhood Programme Romania-Ukraine 2004-2006, beneficiary: Maramures Chamber of Commerce and Industry.

The economic development centers (clusters) are known as a phenomenon of in-time agglomerations of interconnected tradesmen/manufacturers in a certain geographic region [PORTER, 2003]. The parts of those evolving clusters benefit from facilitated contacts, lower transaction costs, technological transfer, etc.

As already known, clusters could be found in almost any historical period and regions. The very first European clusters formed in a spontaneous way around some successful manufactured products that appeared on a local market and than generalized on larger markets.

It is generally acknowledged in the specialized literature that the new form of economic organization enables since the beginning the rising of the competitiveness and business efficiency of all participating companies.

The way how those companies succeed to become competitive and to contribute to the rising of the industrial development level of the countries in which work depends on:

- Complex industrial relationships,
- Intense and continuous technological development and modernization of technologies and products.

So, one can see from the very beginning the benefits from the existing of economical clusters and the efficiency of cooperation in innovation exchanges. In fact, it is obvious that there were strong connections between clusters development and the evolution of the models of innovation processes, especially in the advance industrial economies.

During the developing process, it become also obvious, especially for the governments in the European process of integration case, that in order to ensure the good economical-social-political conditions for clusters development, it is not enough to let the natural conditions to act, but it is necessary to ensure a top-down encouraging system of development process by the means of legal and administrative rules.

Since now, there are known five generations of models of innovation processes that was evolving and developing, directly or as a consequence, hand in hand with the clusters evolution [GABRIEL & SORIN, 2012]:

i.– Technology push: the model considers the exclusive influence of research and innovation, and consists of conceptually and temporally distinct sequential phases, characterized by one-way direction relationship without feedback;

ii.– Market pull: the model considers the exclusive influence of market; the model also consists of conceptually and temporally distinct sequential phases, characterized by uni-directional relationship without feedback;

iii. – Coupling: the model considers that suppliers and customers must be closely "coupled" in integrated teams product development process; the model consists of a sequential logic interactive continuous or discontinuous, divided into distinct functional phases interdependent with feedback interactions between market phases and research.

iv. – Functionally integrated models: the concept consists in functional integration of activities of different internal departments during the innovation process, together with the integration of their achievements in the development of suppliers, customers and partners; the model is built on the integration and simultaneous development of all levels of product innovation model instead of sequentially evolution, involving all departments of the company who are responsible for designing and developing new products. These models involve complex business processes, feedback and mutual relations between the departments of marketing, research and development and distribution companies producing innovation on the one hand and collaborating with other companies supply even with competitors, on the other hand.

v.– System integrated models: a complex overall design integration model of systems and organizations by forming innovative networks, customer units, universities, suppliers and other industrial companies and local communities. The model consists of a combination of innovative technologies for solving problems of high complexity of new products by working within a network involving the use of CAD / CAM software, performance through simulation modeling, the use of rapid prototyping systems-expert. SIN is organized by interconnecting

system engineering teams competitive in research, development and design. Concurrent flows occur both in the sense of crossing streams and competitive flow between them. These innovative activities of the firms are also closely linked with the activities and interests of suppliers, customers and the communities in which firms carry out their activities.

One can see that especially the fourth and fifth of the innovation models should be in a close relationship with industrial clusters in order to accelerate the development of a certain region. This results in today's society, in a process that there is more pressing that the development activities problems of an economic entity to be solved by innovations.

This is all the more acute in Romania, where after the European integration, there are tendencies mostly to models of innovation generation 4 (integrated functional models) and 5 (models of systems integration and innovation network - SIN). Therefore, the national legislation try to build a "Model of business development through innovation" that includes main topics such as [www.asro.ro - ASRO/ CT 383]:

- i. – terms and definitions for language standardization in the field;
- ii. – proper management of innovation;
- iii. – evaluation and audit;
- iv. – support services for innovation management and intellectual property issues.

Another solution to eliminate the obstacles that stand in the way of inventors and entrepreneurs is developing legislation to endorse the transfer of intellectual property through patents.

Laws that relate to intellectual property (IP) can be complex. Success in securing legal rights can positively influence business success related to that idea as well.

One solution that has become lately at the industrial property market is the emergence of 'third parties' - law firm with a specialty in the field of IP, with experts in law and know-how in the field. In addition to these practitioners, there are organizations supporting inventors, such as innovation brokers and consultants providing necessary support for the marketing of these new creations by:

- i. – documentations to the patent applications;
- ii. – providing legislative assistance and specialized services to facilitate maximum market exploit of the patent, also including the necessary calculations to be carried out for determining the patentability of an invention;
- iii. – providing a reliable legal links patenting inventions and constitute warranties both to inventors and investors that each party will meet its commitments.

Examples of such organizations that offer services to inventors and other investors and developers ideas are companies such as British organization UK Intellectual Property Office (UK-IPO) Association Business Link and other commercial providers, specialists from universities and innovation clubs, etc. Such companies apply existing national regulations in countries of activity, such as the British norm BS 8538/2011 and ISO 10002/2004 that have specifications for the provision of services for the marketing of intellectual property rights and promotes the work of fulfilling the needs of individuals and organizations to register their new creations and ensure their commercial rights in patents, trademarks etc., and that sets out the principles of good practice and ethical behavior for organizations providing services to inventors. Another example is also an European organization – European Patent Office (EPO) as analysis of pan-European patents.

Simultaneous approach is recommended in order to work with documents at European level and with the laws and regulations on intellectual property in Romania, where, as a result of legislative efforts, there is ASRO / CT 383 - Innovation management [www.asro.ro - ASRO/CT 383].

The present study is trying to identify the ways of cluster development processes and the factors from models of innovation processes that can work and interact in the potential cluster-type economic agglomerations found in the cross-border region RO-UA.

2 Methodologies

The situation analysis of the results of research and innovation activities in Romania [www.fonduri-ue.ro/ - NDP 2007-2013] shows that in 2008-2010 interval there were an average of 15 documents produced per unit of principal or secondary activity CD, and from those, an average of two documents per unit they were acquired from the market.

Also, every two units have an average of 3 patents and patent applications, and one of 10 units CD acquired a patent or the rights to use a patent.

During the same period, the number of models and designs registered was 1 model per CD unit in average, and at every 10 units were purchased about 4 industrial design models in that period. For other intangible assets such as copyrights, trademarks, recipes, geographical indications, etc., there are one registered asset at two CD units.

It is noted also differences between the adopted strategies of the industrial units, depending on the size and position on the market. Thus, while SMEs produce 61% of registered patents and 55% of technical and economic documents, large enterprises have achieved about 81% of the models and industrial designs protected in the period and 35% of other intangible assets recorded (copyright, trademarks recipes, geographical indications). In recent years there has been a decrease in the number of entries in all categories, including patent citations in ISI papers.

At the level of the exploitation of the CD results, the best values were obtained from technical and economic documents (49% valorisation of the total), followed by models and industrial designs (22%) and patents (9%) valorisation by the mean of sale, transfer of rights industrial property, consulting, etc.

Unfortunately, most of the output of research and development in enterprises are purely theoretical (59% of total valorisation), only 24% having immediate applicability, and 12% require a more complex process of technology transfer.

In the Romanian National Research and Development Plan [www.uefiscdi.gov.ro] there is already a correlation between clusters development and the technological innovation activity by integrating those two directions into the same plan of the development of the Romanian society. On its approach there is a negative gap of Romania behind EU in achieving technological innovation clusters and cluster development stage. Even if there is an advance in registration rate of new companies, there is a negative gap behind EU in the number of local services companies in research and specific training.

The main directions to act in order to enhance the possibility of emerging a cluster that results from all those economic facts are [UNGUREANU & NASUI, 2007]:

- i. Facilitating technology transfer, with some indicators such as:
 - Selling new products to the company, but not in the market;
 - Research and Development Expenses companies;
 - The share of venture capital for start-ups in GDP;
 - Existing local services in research and specific training in research;
- ii. Stimulating investment in R & D and efficient propagation and marketing innovation, with indicators some such as:
 - Public expenditure on R & D;
 - The share of investment expenditure in total R & D expenditure;
 - Innovation capacity;
 - Selling new products to the market;
- iii. Composite indicator:
 - The dissemination and fructify the capacity of innovation.

In [STOICOVICI, BANICA, UNGUREANU, 2008], there is a research of the situation analysis of the results of process of clustering evolution in north-west region of Romania. This research was carried out as an effort made by a team of experts from universities and chambers of commerce and industry from Maramures County in Romania and Transcarpathia County in Ukraine to develop a methodology for analyzing and find the presence and the spreading of economic cluster-type agglomerations in the cross-border region RO-UA.

The methodology have had a quantitative stage to find the general features of the companies operating in this region, and a qualitative stage to establish industrial companies to be analyzed by components such as human resources, collaborations, competition, innovation, research, development and market.

This study is the first work in this field in this geographical area carried out in Romania. The information of interest used was data bases mainly from the chamber of commerce and industry from Maramures (Romania) and the following criteria were considered for finding the economic agglomerations roots:

- i. the number of employees in a certain industry in each geographic region;
- ii. the number of companies representing a certain industry in each region;
- iii. the average number of employees per company in each industry in each region.

Enterprises from the next industries were considered: Sport Items, Toys, Brooms and Brushes; Jewels; Research & Development; Food Industry; Chemical and Pharmaceutical Industry; Machine and Equipment Industry; Electrotechnical and Electronic industry; Wood Processing Industry; Glass and Ceramics Industry; Light Industry; Tourism and Restaurants.

The results of the research showed that four potential forming clusters might be suggested, and two industrial companies from the area of interest best cover the criteria considered.

In order to make a complete analysis of those clusters and to develop an instrument that can do the examination, a questionnaire was conceived with the categories such as:

- *Services used*: the extent to which the companies from the same potential cluster use the professional services offered by third companies on the market.
- *Networking*: the extent to which the companies from the same cluster develop long-term partnership with other companies and external collaborators, nothing but current

supplier-purchaser relations.

- *Institutional relationships*: the extent to which the companies belonging to the same cluster develop collaborations with other entities, such as academic institutions, public authorities, financial institutions, NGO's etc.
- *Innovation*: the extent to which the companies from the same cluster are innovative or not, by using or developing instruments for innovation.
- *Opening*: the extent to which companies from the same cluster tend to direct their activity or their development the outside (extra-company) or rather towards the inside (intra-company) cluster.

3 Qualitative Analysis. Solutions

The conclusions of all those studies until now were that, at the present, in the region of interest, one cannot talk about the existence of an economic agglomeration with the characteristics of an industrial cluster. The analysis carried out indicates that there are a couple of characteristics of clusters that are favourable and can generate in the future such an industrial structure:

- i. the number of employees is more agglomerated in certain industries as compared to others, due also to the local traditions and industrial history in those domains;
- ii. as regards the *enterprises that belong at the industry sector that might be a future cluster* in the region of interest, one can note an incipient crystallization of network-like relationships, which, if supported, can form the future structure of an industrial clusters.

Therefore, development of an agglomeration initiative of the state administrative acts in economy aims to institutionalize this effort by public and private environment explicit manifestation. One can see an interpretation of clustering as well as a tool to achieve administrative management plan development of the firms being in interdependent commercial relations in certain areas. All this state encouraging of cluster development should not change in subventions that will disturb the free market and distort the competition.

Another conclusion is that the influence of research and technological transfer on economic growth and competitiveness of firms is beneficial. This beneficial convince private investors in a free market to work in this field. But in regions with lower economic development, this phenomenon does not occur spontaneously, and the governments manifest interest in encouraging the active enterprises on the market, as already mentioned above.

These influences occur mainly due to the specific operation of market mechanisms in research and development [Lobontiu & Lobontiu 2007]. There are some market failures, such as:

- inefficiency competition mechanisms in scientific research;
- lack of efficient dissemination of achievements in research-innovation-development as public consumer goods;
- existence of incomplete markets;
- informational asymmetries;
- return of initial investments are not entirely toward the original investors.

Innovation activity is a key factor of competitiveness. Innovations in order to reduce economic disparities can not be made only on widely used technology platforms. By increasing the investments in introducing innovation in companies (in pursuit new equipment/services or technology) ensures a high competitiveness on markets.

Also, innovative ideas, products and services, new business models are introduced on the

market by companies founded to capitalize a result of research work, to develop a prototype, or to introduce new technology.

In order to achieve an industrial cluster network, three elements are mainly important [AGIPLAN 1999]:

- i. to define basic organizational principles of the network;
- ii. to determine the range of required business support services;
- iii. to establish a network in communications and know-how management structure.

All those ideas made clear that:

- i. The state has to provide future legislative support for the industries in the region of interest in order to encourage the cluster roots;
- ii. Strengthen the ties between business area and the universities, in order to ensure the quality of technical and economical education of the specialists working in the field of interest;
- iii. To superpose the networks created by the last one or two generations of models of innovation processes over the network created by the cluster that arises.

The last generations of models of innovation processes can evolve the best over such cluster structure.

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