Challenges and opportunities for creative-innovative clusters partnerships

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Abstract. *Clusters of innovation are global economic “hot spots” where new technologies germinate at an astounding rate and where pools of capital, expertise, and talent foster the development of new industries and new ways of doing business. They are vibrant, effervescent ecosystems composed of startups, businesses that support the startup process, and mature enterprises (many of whom evolved rapidly from a startup history). In these ecosystems, resources of people, capital, and know-how are fluidly mobile and the pace of transactions is driven by a relentless pursuit of opportunity, staged financing, and short business model cycles. The aim of this paper, clustering, which is an important model in the development of the countries and the concept of innovation have been reviewed together. The most prominent feature of the industry is to produce Technology. Countries to focus on knowledge-intensive industries and businesses as a result of regional cluster policies for innovation are seen that there is a relation between. Clustering is an important model for an innovational development in Romania. The analysis was carried out for a period of 3 years, for which there were registered the main achievements in the field of product innovation, processes, organizational forms and marketing methods, new or significantly improved, obtained by companies, starting from January 2016 until December 2018, representing Romania’s contribution to the evaluation of the results of the European statistical research on innovation, 2018. Following the innovative activities in which the companies are engaged does the characterization of the innovation. The National Institute of Statistics provides the necessary means for carrying out statistical research on innovation in businesses in the business and industrial environment.*

Keywords: Cluster, Innovative Clusters, Innovation in businesses, Industrial environment.

Introduction

Since the middle of the 20th century and up to now the main influence on the behavior of economies, actors and structures within them, was done through globalization (Genosko, 2006). Officials from the World Bank (2014) e.g. see under globalization “a growing interdependence of countries resulting from the increasing integration of trade, finance, people, and ideas in one global marketplace”. That is why in order to make a clear link between developed theories and concepts leading to economic development of the territories understanding the origin and influence of globalization on current economic processes is very important. It is considered that the globalization was and has driven by dominantly changes in technological, economic, financial, institutional, political and socio-cultural environments. In such within the theories developed in the recent 20 years the concept of regional industrial clusters has received strong

research focus and attention (Perlik & Messerli, 2001; Boja, 2011; Genosko, 2006; Porter, 2000; World Bank, 2009; Sölvell, 2008; Schätzl, 2001). From Porter (1998a) point of view under cluster the “geographically proximate group of interconnected companies and associated institutions in a particular field linked by companies and associated institutions” (Porter, 1998a, p. 199) can be seen.

At the early 90s a special role has been dedicated to analysis of industrial spatial agglomerations and clusters. The results of these studies (Asheim et al, 2006; Asheim & Gertler, 2005; Audretsch & Feldman 1996; Bathelt & Glückler, 2002; Feser, 1998; Christensen et al. 2012) show that clusters tend to indicate particular positive influence on the development of the territories. Malmberg and Power (2006), Wrobel (2008) and Blien and Maier (2008) say that it is often seen “as a synonymous with economic growth, jobs, innovations and synergies” (p.6) and is strongly associated with prosperity and wellbeing of territories as it offers conditions to produce innovation and competitiveness through actors’ interaction system in defined spatial proximity. Porter (1998b) also argues the connections that develop in cluster “are fundamental to competition, to productivity, and especially, to the direction and pace of new business formation and innovation” (Porter, 1998b, p. 205). Finally clusters much better align with the current needs of the company's business models. Creativity, knowledge (Bratianu & Bejinaru, 2019; Bratianu & Bejinaru, 2020; Bratianu et al., 2011) and innovation have become the main driving forces of regional economic, social and cultural development. Both in academic literature and in policy documents, creativity is considered essentially an urban phenomenon because human, economic and institutional resources are generally located in the big cities. Intangible resources should be considered as strategic resources because they constitute the intellectual capital of any organization (Bratianu, 2018; Bratianu & Vatamanescu, 2017).

However, the attraction and retention of talent, namely of the creative class that mainly is represented by business studies graduates (Prelipcean & Bejinaru, 2018), to small urban centers and rural areas could be a solution for their economic revitalization, reversing de-population and desertification trends (Hadad, 2018).

Such openness in the definition results in the attribution of clusters of different types depending on their structure, sizes, forms, industries, regions and countries (Porter, 1998b). Existence of such a variety of possible clusters can often lead to overlap with other agglomeration types and explains the blurriness of the concept. Unsurprisingly this has given rise to different cluster typologies, and in Table no. 1 we present a selection of these.

Table 1. Different typologies for cluster differentiation

Gulati (1997)	Modern urban cluster	Serve for metropolitan areas and export markets
	Artisanal rural cluster	Serve only rural/local demands
Santee (2002)	Dormant clusters	Production for only rural/local consumption
	Dynamic clusters	Deep cooperation and will to enter global change
Schmitz, Nadvi (1999)	Incipient clusters	In a early stage of industrial development; located in poor areas;
	Mature clusters	Production for global markets; vulnerable to global change
Altenburg, Meyer-Stamer (1999)	Surviving clusters	Production is primarily conducted for local needs
	Advanced mass production clusters	Production is to serve the local market but there is the strong external influence/competition
	Cluster of transnational corporations	Based around foreign companies, which settle in particular locations but have weak ties with local actors
Duque, Rey (2008)	Regional industry clusters	The spatial location of industries is the important characteristic; Clusters whose elements share a common regional location, where the region is defined as a metropolitan area, labor market,

		or other functional economic unit.
	Functional clusters	Matters what companies produce; companies offering or producing similar services or products belong to the same cluster
	Value-added industry clusters	Focuses on products/services flows through companies, rather than location or activity; "a subset of industries of the economy connected by flows of goods and services stronger than those linking them to the other sectors of the national economy"

Source: authors elaboration.

European Strategic Cluster Partnerships and their importance

In recent years, the importance of clusters as drivers of innovation has been recognized, enabling "open innovation" and the creation of new ideas through cooperation between companies and research institutions, mostly like universities (Bejinaru, 2017; Hapenciuc et al., 2016). As emphasized in the Europe 2020 Flagship Initiative Innovation Union, "*internationally competitive clusters play a vital role in bringing together (...) large companies and SMEs, universities, research centers and communities of scientists and practitioners to exchange knowledge and ideas*". In this context universities have multiple roles in managing the knowledge fluxes inside the clusters framework and to stimulate the transformation of knowledge inputs into knowledge outputs (Bejinaru & Prelipcean, 2017; Bejinaru & Iordache, 2010).

After a while due to intensive internationalization the competition between companies changed from being based on price to quality. More than ever the product / service started to be innovation and learning driven (Mackinnon & Cumbers, 2007). In 1980 the research group "Groupe de Recherche Européen sur les Milieus Innovateurs" (GREMI School) started to discuss knowledge enhancing agglomeration, which was called "innovative milieu". They stressed the importance of socio-institutional aspects for economic activities and emphasized the significance of regional context for the enhancement of innovation and interaction between innovative economic actors (Benner, 2012; Bratianu et al., 2006; Dima et al., 2016; Dima et al., 2017). Although here the issue of proximity is very important, Genosko (2006) sees the concept of innovation milieu more as a cultural rather than geographical approach. In reference to Genosko (2006) innovation in innovative milieu is a collective process, which is based on the division of labour among big and small companies, private and public research and education institutions, suppliers and supporting organizations.

The concept of innovative cluster refers to the role of cluster into the learning network, understood as the "structure built to increase the level of knowledge and the participants' innovative capacity and to give the organizations the possibility of entering into relationships with other organizations and to support the voluntary learning of their employees" (Bessant & Tsekouras in Passiante and Secundo, 2002). For this type of cluster OCDE (2001) uses the term of reduced form national innovation system, which can be interpreted as a replica of the entire system at the industrial cluster level or as an entity, which keeps the core elements of the national system. Bortagaray and Tiffin (2005, p.271) define the innovative cluster as "groups of firms, research centers and investors that work together within a narrow physical proximity in order to create new products, technologies and enterprises. They work into invisible relationship networks within a complex social framework where the collective industrial activity is based on learning and knowledge".

The two authors consider the innovative clusters a category of industrial clusters that can be divided into three subcategories, in accordance with the intensity of innovation, i.e.: innovative industrial clusters (centered on incremental innovations as the authors suggest,

improvement of products, processes and routines), proto innovative clusters (focused on the latest knowledge as competitive means at global level, that supports a limited growth of the knowledge based firms but which lack all the elements to guarantee the medium-term development) and mature innovative clusters (developed inside the social community structure, which gather competitive international firms and path the rhythm and the direction of the world scientific and technological research). The model of the innovative cluster proposed by Bortagaray and Tiffin (2005) for the Latin America is presented in Table 2:

Table 2. Innovative cluster

Elements	Contents	Description
Tangible	Knowledge based firms	The firms are those that store and generate knowledge, they assure an appropriate framework for the learning process, they induce trust and cooperation. The anchor firms are defined as "wide sources of technology, markets and expertise". Beside them, there is a "swarm" of highly innovative small firms, spinoffs, startups and big corporations, the last ones being themselves innovation systems in miniature.
	Knowledge inputs	Universities, research-development laboratories, publications, expertise, other sources.
	Consulting services	Firms specialized in technology transfer, legal services (brands, patents), accounting firms, industrial design firms, industrial engineering firms, marketing firms, patronal associations.
	Specialized input	Specific or to be adapted materials, instruments, equipment.
	Markets	Sophisticated customers, the government-consumer, tenderers, transport and communication networks for the world customers.
	Cluster support	Existence of public and private organizations to manage the network, to promote it, to assure coordination (a kind of turntable plate of the cluster). The business incubators are also rated as support organizations.
	Financing	Capital, risk capital and knowledge based banks with highly local character.
Intangible	Culture	Favorable social climate: local cultural values, the contractors' value system, the business and socio-cultural environment, the legal framework.
	Integration	Formal and informal links and interactions within individuals and organizations.
	Life quality	Quality of life for the persons who work into community where the clusters operate, measured through the cost of house, leisure facilities, quality schools and hospitals, urban services and so on.

Source: Adaptation after Bortagaray and Tiffin (2005), p.73-79.

Methodology

In the European Union there has been a debate regarding clusters for almost two decades, however they represent a relatively new and almost unknown domain in some areas. The champion of the development of innovative clusters in Romania (except the capital) - what they represented before the emergence of new technologies - professional associations - is, without a doubt, Cluj County. Here, too, operate the only three clusters with the highest European qualification, "Golden Label" in Romania: AgroTransilvania Cluster, Transilvan Furniture Cluster and ITech Transilvania. The direction of the knowledge economy in the European Union and in the world is the direction of innovative digital hubs (Neamtu et al., 2019). The main difference consists in attracting in the hubs several fields of activity, and not the specialization on a certain domain, these digital innovation hubs representing, according to the executive director of Transylvania IT Cluster, Bianca Muntean (designated the cluster manager of the in the

European Union), "the backbone around which all financial support measures from the 2021-2027 programming period will be built on the Digital Europe and Horizon Europe program".

Results and discussions

Currently, in the North-East Region, seven clusters are active, specialized in: imagistic medicine (Imago-Mol Iași), garments-knitwear-textiles (ASTRICO North-East), tourism (Bucovina Tourism Association), IT (New-Media ICONIC Iași), agri-food technologies (Ind-Agro-Pol), IT&C (EURONEST IT&C Hub, Iași), biotechnology (bioROne), constructions (Iasi Builders' Guild). The statistical data, as they are available on the website of the Northeast Regional Development Agency, are summarized in table 3.

These totaled about 200 members, with a total turnover of 429.7 million euros (at the level of 2017) and have as partners among local bodies and universities:

1. "Gheorghe Asachi" Technical University Iași;
2. "Grigore T. Popa" University of Medicine and Pharmacy, Iași;
3. The University "A.I. Cuza", Iași;
4. Iasi County Council;
5. "Stefan cel Mare" University of Suceava (member of IT&C EuroNest, IT & HUB and APT Bucovina);
6. Suceava Chamber of Commerce and Industry;
7. Suceava County Council.

For comparison, only Transylvania IT Cluster has more than 100 organizations (economic agents, two universities, a research institute, two local / governmental bodies, a business center and a development association) and provides services in about 30 areas (eGovernment, IT, insurance, pharmaceutical, banking & finance, health, energy, logistics, education, solutions for smart cities, telecommunications, etc.)

The North-East region provides, from this point of view, a huge potential for development, following the successful model of clusters in the North-West region, and the development of innovative clusters or hubs can be shaped even around industrial parks, as the one from Miroslava (with a 100% occupancy degree, a real success) or the one planned to be built near "Stefan cel Mare" Suceava International Airport. The concentration of economic actors and expertise can be a suitable ground for any human resources consulting company, in its effort not only to survive in a market not just dynamic, as in Suceava County, but also to develop as a real intermediary between supply and demand (Bejinaru & Hapenciuc, 2016).

Statistical research on innovation is also analyzed in territorial profile, at the level of regional development, the companies being selected in the sample by their headquarters (where they have their address). The analysis of the results is done both for all enterprises and only for small and medium-sized enterprises (SMEs), which highlights the best innovation at regional level. Thus, in the period 2016-2018, the highest weights were registered in the South-East Region 16.9% and the North-East Region 13.8%, and the lowest weights were in the South Muntenia Region 4.2% and Southwest Oltenia 3.2%. The highest shares of innovative companies only in products and / or processes were found in the South-East Region, 7.4%, and the lowest in the West Region, 0.7%.

Table 3. Clusters in the North-East Region

Year of establishment and Name	Number of members in the cluster and employees	Annual turnover (cluster members)	R&D rate / cluster members	The main objective of the cluster	Basic activities of the cluster:	Member Universities
2001 - The Association for Tourism Bucovina Region: N-E Headquarters: Suceava	39 / 610	3,3 mil. Euro	-1	Improving the quality of tourism in North-East Romania	Development of new tourism products Supporting the strategic development of this sector Development of promotional materials Training for tourism personnel International exchange of good practices in the context of European projects	"Stefan cel Mare" University Suceava (founding member)
2010 - Astrico North East Textile Cluster Region: N-E Headquarters: Savinesti (Neamț County)	30 / 1860	85 mil. Euro	1%	Internationalization of companies (export, etc.)	Promoting and supporting the development of the textile industry in North-East Romania. Collaboration between the members of the cluster for establishing contacts with new clients. Development of joint projects for new products. Joint organization of participation in specialized events such as economic missions and fairs. Active involvement in the training of the labor force. Date	The Faculty of Textiles, Leather and Industrial Management of the Technical University «Gheorghe Asachi» Iași
2011 - bioROne - cluster in biotechnology Region: N-E Headquarters: Iasi	13 / 1609	72 mil. euro	<1%	Increasing the innovative capacity of the regional economy	Networking activities and international relations, Transfer of know-how Lobby, Transposition of the innovative culture in the economy, Support for financing opportunities and programs, Research and development of the good quality human resource in the region	National Institute for Research and Development for Textiles and Leather, Bucharest

2013 - Innovative Regional Cluster EURONEST IT&C HUB Region: N-E Headquarters: Iasi	21 / 447	21,6 mil. Euro	5%	Increasing the innovative capacity of the regional economy	Networking activities and international relations Easier access to training Transfer of know-how, Lobby	Unavailable data
2012 - ICONIC Region: N-E Headquarters: Iasi	23 / 200	1 mil euro	2,5%	Increasing the innovative capacity of the regional economy	Networking activities and international relations Easier access to training Transfer of know-how, Lobby	"Gheorghe Asachi" Technical University, Iași "A.I. Cuza" University, Iași
2012 - IMAGO-MOL Region: N-E Headquarters: Iasi	8 / 29	0,78 mil euro	25%	Increasing the innovative capacity of the regional economy	Develop a strategic action plan to support the competitive development of the medical imaging sector in the North-East Region.	"Grigore T. Popa" University of Medicine and Pharmacy, Iași
2011 - IND-AGRO-POLE Region: national Headquarters: Iasi	100 / 700	164 mil. Euro	3%	Increasing the innovative capacity of the regional economy	Cooperation, Research, Development, Innovation Training, Marketing and Public Relations Networking and internationalization	University of Agricultural Sciences and Veterinary Medicine, Iasi
2013 - Guild of Builders from Iasi Region: N-E Headquarters: Iasi	23 / 1845	82 mil euro	-	Platform for collaboration, development, research and innovation in the civil and individual construction industry.	Improvement of the quality of the construction works carried out in Iasi county; Increasing quality standards and transparency in the field; Improving the image of Iasi builders in relation to local authorities and public opinion; Offering information and solutions regarding business opportunities in the field; Developing the businesses of the member companies in the cluster and increasing their competitiveness at national and international level.	"Gheorghe Asachi" Technical University, Iași

Source: authors elaboration.

Figure 1. Share of enterprises, in total enterprises, by types of innovations, in territorial profile, between 2016-2018

Source: Authors' own research.

The North-East region had the most enterprises with innovations of organizational and/or marketing forms, 7.8% and the smaller South-West Oltenia Region 0.5%. In the North-West Region, most enterprises were highlighted with both product and / or process innovations and with 4.6% organizational and / or marketing innovations, the fewest being registered in the South-West Oltenia Region, 1.0%. In the economic sectors, the same regions had the highest shares. Thus, in the industry sector 17.9% of enterprises were innovative in the South-East Region and 13.0% in the North-West Region, and in the services sector 15.6% of enterprises were innovative in the South-East Region and 15, 5% in the North-East Region. The highest percentages of innovative SMEs were registered in the South-East Region 16.3% and in the North-East Region 13.6%. The least innovative SMEs were in the South-West Oltenia Region (3.2%).

In the South-East Region there were the most innovative SMEs of products (4.8%) and processes (8.0%), and in the North-West Region, the most innovative SMEs of organization methods (10.0%) and marketing methods (9.1%). In the North-East Region, are located the highest share of innovative SMEs (3.4%) that received public funding. The SMEs that cooperated the most in carrying out innovative activities were 2.6% in the North-West Region. In the South-East Region there were the most innovative SMEs of new products for the enterprise 2.0% and in the Bucharest-Ilfov Region there were the most innovative SMEs of new products on the market 0.6%.

Table 4a. TOP 5 - the most innovative activities of SMEs, in territorial profile, between 2016-2018

Top	North-West		Centre		North-East		South-East	
	Activities	%	Activities	%	Activities	%	Activities	%
1	Editing activities	47,9	Manufacture of basic pharmaceuticals and pharmaceutical preparations	28,6	Research and Development	100,0	Air transport	100,0
2	Manufacture of substances and chemicals	41,4	Postal and courier activities	28,6	Service activities and information technology	64,8	Supply of steam and air conditioning	57,1
3	Research and Development	26,6	Other industrial activities	28,3	Manufacture of computers and electronic and optical products	42,9	Architectural and engineering activities; technical analysis	50,0
4	Wood processing, manufacture of wood and cork products, except furniture	23,5	Manufacture of clothing	27,1	Manufacture of electrical equipment	35,0	Manufacture of textile products	45,0
5	Industry of metal constructions and metal products, excluding machines, machines and installations	27,6	Manufacture of other means of transport	23,5	Manufacture of beverages	33,3	Manufacture of substances and chemicals	44,4

Source: authors elaboration.

Table 4b. TOP 5 - the most innovative activities of SMEs, in territorial profile, between 2016-2018

Top	South-Muntenia		Bucharest-Ilfov		South-West Oltenia		West	
	Activities	%	Activities	%	Activities	%	Activities	%
1	Service activities in information technology	45,2	Decontamination activities and services	50,0	Storage and ancillary activities for transportation	17,6	Metallurgical industry	71,4
2	Other industrial activities	35,0	Tanning and finishing of leathers, manufacture of travel and leather goods; fur preparation and dyeing	27,2	Editing activities	15,4	Manufacture of other means of transport	35,3

3	Manufacture of basic pharmaceuticals and pharmaceutical preparations	28,6	Industry of metal constructions and metal products, excluding machines, machines and installations	26,0	Industry of metal constructions and metal products, excluding machines, machines and installations	13,9	Gas production, distribution of gaseous fuels through pipes	33,3
4	Research and Development	28,6	Service activities in information technology	25,7	Food industry	12,9	Manufacture of basic pharmaceuticals and pharmaceutical preparations	25,0
5	Printing and reproduction on record of media	25,0	Wood processing, manufacture of wood and cork products, except furniture	24,3	Manufacture of machinery and equipment	12,5	Manufacture of substances and chemicals	23,5

Source: authors elaboration.

From the data of the statistical research for the period 2014-2016, the top of the first 5 innovative economic activities of the SMEs, can be traced in the tables 4a and 4b. The most innovative economic activities in which SMEs operate were as follows: in the North-West Region, publishing activity 47.9%, in the Central Region, manufacturing of basic pharmaceuticals and pharmaceuticals 28.6%, in the North Region - East, the research and development activity 100.0%, in the South-East Region, air transport 100.0%, in the South-Muntenia region, services activities in information technology 46.2%, in the Bucharest-Ilfov Region, activities and decontamination services 50.0%, in the South-West Oltenia Region, storage and ancillary activities for transport 17.6% and in the West Region, the metallurgical industry 71.4%.

Regarding the cooperation or active participation of the enterprise with other companies or institutions, in innovative activities, at the level of Romania, we summarize the following: during 2016-2018, 17.9% of the total innovative companies of products and / or processes had agreements cooperation in realizing their innovations. Better cooperation is observed among large companies, 23.3% of their total cooperated.

The main cooperation partners of the innovative companies were suppliers of equipment, materials, components or software 9.3% and customers or buyers in the private sector 7.7%. In economic sectors, the industry sector cooperates more than in the services sector.

Table 5. Share of the companies involved in cooperation, by size classes, activities and types of partners, in the period 2016-2018, %

Partner type	Companies				Activities	
	Total	Small	Medium	Large	Industry	Services
Any kind of cooperation	17,9	18,6	13,8	13,3	21,8	13,8
Other companies within the group	3,0	2,2	2,5	12,1	4,0	2,0
Suppliers of equipment, component or software	9,3	7,9	11,5	16,6	8,6	10,1

Customers or buyers in the public sector	2,4	2,0	2,2	6,3	1,5	3,2
Customers or buyers in the private sector	7,7	7,8	5,6	13,0	9,7	5,7
Competitors or other businesses in the same sector	2,6	2,0	2,6	8,5	1,8	3,5
Consultants, commercial laboratories	4,6	4,7	3,3	7,6	6,6	2,5
Universities or other higher institutions	9,1	10,7	4,0	8,1	11,3	6,8
Public administration, public research institutes	4,9	5,4	2,2	8,1	5,0	4,7
Private research institutes	3,7	3,9	2,8	4,9	3,7	3,8

Source: authors elaboration.

Conclusion

According to the European regulation on innovation statistics, the scope of statistical research on innovation is represented by the total population of enterprises that carry out activities in industry and services. The National Institute of Statistics provides the necessary means for carrying out statistical research on innovation in businesses in the business and industrial environment. The companies were selected according to their size (according to the number of employees). The size of the company is evaluated according to the criterion of the average number of employees, during the reference period. In accordance with the criteria issued by EUROSTAT, the delimitation of the companies is carried out in the following intervals:- small businesses: 10- 49 employees; - medium enterprises: 50-249 employees; - large enterprises: 250 employees and over.

The statistical unit used was the enterprise, defined as a grouping of legal units that is constituted as an organizational entity for the production of goods, commercial services, or services of social interest, which benefit from a decision autonomy, especially to ensure its current resources. An enterprise carries out one or more activities, in one or more places (local headquarters). The selected companies have legal personality and carry out activity in the industry and part of the services, according to the scope of the statistical research.

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