

## INDUSTRIAL CLUSTERS AND REGIONAL DEVELOPMENT IN ROMANIA

Claudia Popescu<sup>a\*</sup>

<sup>a</sup> *Academy of Economic Studies, Faculty of International Economics and Business, Bucharest, Romania*

**Abstract:** The analysis of industrial clusters became a very actual topic for academic debates and for Governments trying to foster economic growth. In Romania, since the end of the 1990's until the present day there have been many researches focussing on the identification of industrial clusters and on the analysis of triggering factors which stood at their origins. All these studies concluded the fact that Romanian clusters appeared „naturally” through industrial attractiveness for direct foreign investments and in the absence of a regional policy to stimulate the formation of competitive productive agglomerations. On the other hand the regional development policy since the end of the 1990's has led to the development of public clusters. Beginning with 2005, four cluster initiatives were promoted as instruments to grow competitiveness through collective learning.

**Key words:** Industrial clusters, Cluster initiatives, Regional development, Romania.

### Industrial Clusters from Marshall to Porter

Beginning with the 1990's Romanian industry radically changed in terms of: property regime (in 2007 within the total number of industrial companies 99,5% were privately-owned), size (for the same year within the total number of industrial companies 98,2% were small and medium-sized enterprises), international credibility and performance (in 2007 industrial companies concentrated 49% of the invested foreign capital and concentrated 90% of Romanian exports) (Romanian Statistical Yearbook, 2008). All these changes modified the factors and principles of localisation for industrial activities leading to the reconsideration of industrial branches at local and regional level. Industrial companies are relevant for creating mechanisms of regional development and of empowering the competitive advantages of the national economy. Starting from Paul Krugman's statement – „companies and not countries are

competing with one another” and from Michael Porter's words – „economies are clusters of activities”, the industrial clusters approach draws attention of both academics and policy makers. Romania's integration to European Union put an accent on this topic taking into consideration that one of the major objectives of European economy is to build a knowledge-based economy. Moreover in the context of the present economic recession industrial clusters represent an efficient tool to grow competitiveness in a global economy.

The scientific debate on industrial clusters started at the beginning of the 20th century when Alfred Marshall (1919) considered the fact that industrial activities could be organized in two ways: either in one big unit or in small units located in settlements specialized in one industrial branch, or what he called industrial district. The small enterprises represented the dominant form of organization for industry in the first half of the 20th century. After the Second World War mass production and mass consumption of standardized products imposed the supremacy of big enterprises. The

\*Corresponding author:  
Email: cldpopescu@yahoo.com

general rule of the Fordist system became the big enterprise, vertically integrated, based on internally generated scale of economies for standardized products in a predictable market. At the middle of 1980's the sociologists Michael Piore and Charles Sabel (1984) considered that "the second industrial division" is taking place, characterized by a turning to regional economies organized around networks of small companies belonging to the same industrial branch. In 1990 Michael Porter published a very influential article on industrial clusters, coming back in 1998 with a new study on regional clusters. Clusters theory defined by Porter became a reference point for the study of specialized industrial agglomerations or of local systems of productions. Although at the beginning there were accepted differences between the Marshall's district and the clusters defined by Porter, lately the two theoretical concepts merged. Industrial clusters attracted researchers' attention as the scientific literature dedicated to them is very reach. It initially focused on the study of clusters such as Silicon Valley (Saxenian, 1994) or "The Third Italy" (Beccattini, 1989), and afterwards on a diversified typology of industrial clusters at the worldwide level. Industrial clusters crossed over the limit between fundamental scientific debates and the sphere of action and intervention of public policies, becoming from a purely theoretical concept an instrument for industrial and regional development policies. According to Porter's definition (1998) clusters are geographic concentrations of interconnected companies, specialized providers for raw materials and services, companies of correlated industries, associated institutions (e.g. universities, standards agencies, trade associations) which compete but also cooperate. The key word in Porter's definition is geographic proximity. Clusters depend on informal contacts based on trust and reciprocity. The transfer of ideas and the common resources of labourforce increase competitiveness and accentuate the competitive advantage of the cluster as a whole. Clusters are based on relations and interdependences among the actors that form

networks of production providing innovative products and services.

The theoretical foundation of districts/clusters started with "Marshall's trinity" constituted of a labourforce basin, specialized providers and knowledge transfer. The spatial concentration of companies coming from the same industrial branch determines the qualification of labourforce, the demand determines the localization of specialized providers and the ideas circulate fast from one unit to another inside the same spatial concentration of industries. Porter extended this conceptual schema adding new factors to "the competitiveness diamond". Beside the availability of resources and the access to information he considered the aims and the pressure to innovate and to invest at the level of each company, to be essential. "The new diamond of innovation" (Lundvall, 1992; Nelson, 1993; Guth, 2004) is the one that explains and supports regional growth. Innovation refers to intra and interinstitutional knowledge transfer, to individual and institutional learning, to social capital, social and economic cohesion and to research and development environment. Clusters'relational potential reflects through synergic effects on the performance and competitiveness of the component companies. That is why „Triple Helix" model (Etykowitz, 2002) explains the success of industrial clusters through relations of competition and collaboration among universities and research centres as providers of products, innovative technologies and services, industrial companies and especially small and medium-sized enterprises which absorb the offer for innovation and authorities responsible to facilitate this process (ministries, regional authorities).

### **Stages of cluster generation and evolution**

The formation and development of clusters represent a widely debated topic in the international scientific litterature (Storper, Walker, 1989; Brusco, 1990; Grabher, 1993; Harrison, Kelley, 1996; Storper, 1997; Porter,

1998; Pinch, Henry, 1999). Clusters appear, grow, enter decline and transformation phases. Although, individually, clusters may evolve in very different ways, there can be distinguished six phases for their development model. Firstly the appearance of a cluster may be often linked to a certain historical context such as the availability of some resources, specific knowledge of research and development or know-how, specific requests of a company group spatially concentrated the localisation of companies or entrepreneurs that develop and stimulate the growth of technological innovations. Growth is generally related to explicite factors of localisation, particularly the long term development or to knowledge that leads to creation of new products. The first phase implies the making of new companies sharing the same level on the production chain and concentrating spatially. The agglomeration of companies is followed by local competition which generates innovation and entrepreneurship. Secondly, once the agglomeration of companies is established, external economies are progressively shaped leading to a cumulative process. External economies include the creation of a set of specialised providers and service companies generated by the vertical desintegration of companies and the appearance of a specialised labourforce. Development may reduce the costs of some common inputs as the economies resulted from the costs of production of the specialised providers are transferred to the client level. There appear benefits not available for other isolated companies. Costs may be also reduced through the presence of an experienced and qualified workforce. The third step in the clusters' formation and development would be the foundation of some new organisations which provide services for several companies in the growing cluster, such as knowledge organisations, universities and research centers, business associations. These organisations promote local collaboration, learning processes and transfer of technological knowledge and own competencies in domains such as strategy, technology, market development which cannot be achieved by small enterprises although they need them in order to make

certain important innovations. The fourth step is the one in which external economies and the foundation of local organisations accentuates visibility, reputation and attractivity of a cluster. As a result new companies and a more numerous labourforce is added generating an attractive local economic environment with a further growing potential. The fifth step is the creation of a relational potential which stimulates the flow of information and knowledge through informal collaborations helping to coordinate economic activity. That is why mature clusters contain specific differentiated relations localised at the individual and organisational level, based on routines and conventions which function only in the proximity context. The process of communication which contains flows of not encoded information is usually complex and insecure, often implying dense human relationships which are on their turn stimulated by the proximity among individuals, companies and organisations. The sixth step refers to the fact that although clusters renew themselves or become part of a new cluster some of them enter a decline period. Decline reflects a technological, institutional, cultural or social lock-in of the business behaviour. Regional industrial development can also be blocked due to the same socio-economic conditions that initially leaded to the cluster formation. The initial strengths of a cluster such as: qualified labourforce with specialised skills; well developed and specialised networks of companies, knowledge organisations, institutions for education and professional training; tight relations among companies; politic support through regional institutions can also become obstacles for innovation. Clusters may fall in the trap of „rigid specialisation”. Their evolution have the tendency to promote the old rules and values and to reject new ideas what represents a danger for cluster survival in the context of global economic and technological changes.

## Competitive advantages of clusters

Numerous studies evidenitiated the competitive advantages of clusters explaining

why these are playing the role of growth engines for local and regional economies.

Collective efficiency (Schmitz, 1995) results from external economies and common actions. External economies appear when the costs of market transactions do not include entirely the costs and the benefits associated to these transactions. The most evident benefits appear from the easy access of companies within the cluster to local providers specialised in inputs and services, to the labourforce market owning relevant training and knowledge, to the local industrial „atmosphere” in which ideas and technological know-how are available. Common actions generate profit through cooperation and collaboration relationships among companies in a variety of institutional forms. The most frequent form of collaboration among the individual companies is the bilateral one, for instance, the horizontal collaboration by using capital goods from the competitors or the vertical collaboration in order to improve products between producer and user or seller. In the case of consolidated clusters, they may include various institutions from trade associations, to selling consortiums or for political lobby.

Trust, social environment and transaction costs (Brusco, 1990; Dimou, 1994; Markusen, 1996; Amin, Graham, 1996) represent other competitive advantages of clusters. Social environment is a well defined concept in the analysis of industrial districts which describes socio-cultural aspects including attitudes and traditions such as the local ethos of work, shared values and identity. Cultural, psychological and sometimes political common background generates synergic effects. An example would be the innovative social local atmosphere and the entrepreneurial environment which encourages labourforce to combine the competitive spirit with social responsibility. The synergic effects are related to confidence in various forms. Social environment is considered important for reducing different types of uncertainties with whom small enterprises usually confront. Companies within the industrial clusters have advantages regarding the costs of transactions. Compared

to small and isolated enterprises, companies within clusters win from reducing the costs of communications, transport and distribution. In many cases they commit themselves in multiple and sophisticated transaction relations implying complex components, goods and services and they do it without signing formal contract arrangements. They base in exchange on reciprocal trust and social institutions such as traditional conventions which describe the quality and the shape of products, behaviour rules which lead financial transactions, socially imposed penalties against the opportunist ways of acting.

The formation of firms networks (Barr, 1997) is an essential characteristic of clusters and their main source of success. The interactions among the companies of a cluster include cooperations and strategic alliances which are not simple market transactions and are not governed by the internal organisation laws. Companies show rather the characteristics of a „social network” with specific economic properties. In the study of industrial sectors, networks play a significant role in explaining differences of productivity among companies. It was demonstrated the hypothesis that networks facilitate knowledge flows among companies and entering a network can turn decreasing profits of an isolated company in constant or growing profits. The formation of a network is not a homogenous process, two types of networks being distinguished: networks based on morality and networks based on innovation. The first type militates for reducing the opportunist behaviour and other forms of incertitude through the support of reputation and the accentuation of the feeling of appartenence to a community. The others are channels for knowledge diffusion. Networks play an important role in facilitating companies’ strategic objectives which may include the control in the direction of technological change. Each company depends on the resources controlled by the others, that is why it tries to ensure its access to them by the position it occupies within the relationship network (Camagni, 1991).

One of the characteristics of the post-fordist period in the evolution of industry at

the worldwide level refers to the flexible specialisation (Piore, Sabel, 1984). Industrial system experienced a paradigm shift from the inflexible fordist mass production to a way of production which implies increased desitegration and specialisation at the company level. As the market asks for more differentiated products and technological progresses make possible their accomplishment, competitive elements do not refer anymore only to price but also to quality, trust and on time supplying in small quantities. Flexible specialisation brings new challenges and opportunities both for big and for small units. Big enterprises have to internally decentralise, to create more efficient relationships of cooperation with providers and subcontractors. Small enterprises have to answer to small and sudden orders by intensifying their specialisation in the context of strong inter-firm networks. Hence the relevance of industrial clusters. On the background of flexible specialisation, important markets decrease and become instable. Competing companies on these markets have two options (Pyke, Sengenberger, 1992): the first one would be that in which the company invests in flexibility in order to pass fast from one product to another and without high costs through ensuring skilled labourforce and multifunctional equipments. In this way the company creates a certain stability, becoming easily adaptable. The second option refers to the cheap labourforce employed on a short term and to minimum investments of capital. The company grows and reduces its labourforce through successive hiring-lay offs, in order to meet the orders' fluctuations. The first option is a hypothesis tested by several successfull clusters. Flexible specialisation offers a coherent set of reasons supporting potential advantages for small companies to enter an industrial cluster.

### Types of clusters

Industrial clusters include a great variety of industries, companies and relations. That is why researches focussed on taxonomic

definition (Garofoli, 1991; Guerrieri, Pietrobelli, 2004). Amin (1994) distinguishes among three categories of clusters: handicraft and manufacturing clusters, specialised in traditional industries (shoe-making, textile, furniture, metal working) and which illustrate intense cooperation, specialisation of production, social and informal institutional arrangements; high-tech clusters show enormous budgets spent on research-development activities and big volumes of risk capital (speculative) next to the performance in the intensively technology consuming production; clusters dominated by big companies show the importance of regional institutional support for professional qualification, education, infrastructure for research-development and communications. Pedersen (1997) proposed another classification namely: diversified industrial clusters based on vertical specialisation of individual companies and of the cluster as a whole in which the competitiveness derives from the collaboration of companies inside and outside the cluster; subcontracting clusters based on strict vertical and horizontal specialisation in which the greatest part of companies are depending on one or more big enterprises. The competitiveness results from the reduced costs of transactions with a big enterprise. On the other hand the big unit ensures the most part of the benefits. Another classification belongs to Humprey (1995) who defines: clusters generated by producer as being characteristic for intensively consuming industries of capital and technology, dominated by great providers which coordinate upstream and downstream relations by planning the value chain and defining the final product; clusters generated by client characteristic for labourforce intensive-consuming industries in which suppliers, market experts and trade companies play an important role in the formation of decentralised networks of production. The three authors illustrate the variety of perspectives which might be adopted for classifying industrial clusters. Other types may be identified by using historic, social elements or criteria referring to the nature of processes of production.

## Natural Clusters versus Public Clusters Methodologies of cluster identification

In Romania, since the end of the 1990's there were carried on several studies dedicated to the identification of industrial clusters and the analysis of causal factors which led to their emergence. They concluded that in Romania clusters were „naturally” formed by industrial attractivity for foreign direct investments and in the absence of a regional policy to stimulate the formation of competitive productive agglomerations. Although not-systematic, belonging to different contexts of analysis and using various methodologies these studies evidenced the significant potential of Romanian industry to generate clusters. By using different methodologies, these studies reached different results (Table 1). There have been identified clusters in traditional or IT industries, in various places, called potential, emergent or proto-clusters. In most of the cases they represent spatial concentrations of companies defined by geographic proximity and not industrial clusters, as they are settled productive systems, vertically and horizontally desintegrated. Certain studies underline the lack of inter-firms networks within the identified clusters. For instance The Guide for implementing in Romania the concept of innovative cluster (2009) quote INCLUD project's (2003-2004) conclusions: „there are important industrial agglomerations but they cannot be considered clusters as they lack horizontal and vertical collaboration relations”. The most recent study „Clusters and Potential Clusters. A Mapping Exercise (2010)” which identified through several regional workshops 55 potential clusters having as a common weakness the lack of cooperation, reached the same conclusion. The question to what extent one can mention real clusters in this context is obvious. The answer is offered by the same study which tests the 55 clusters by using criteria like cooperation and the providing of innovative services. After this evaluation only 19 clusters were validated. The results contradicts the list of 83 regional clusters (out of which 53 are industrial) announced on the internet site of European Clusters Observatory. The great number of clusters registered on this site with no additional information put a question mark

on the fact whether cluster concept is correctly understood and used. Referring to the 83 clusters The Guide for implementing in Romania the concept of innovative cluster (2009) which copies the list of Romanian clusters from the European website states the fact that: „one cannot perceive clusters at the level of a whole development region but rather industrial concentrations / agglomerations around cities with a high industrial potential”. The same document mentions the results of another exercise meant to identify clusters, integrated by InovCluster Project (2008), and which elaborated two different lists of potential clusters by using the same methodology (surveys and regional peer-reviews). The 30 potential clusters that resulted after the InovCluster consulting sessions were different from those identified two years later by Clusters and Potential Clusters. A Mapping Exercise, although it used basically the same methodology. The confidence in these studies is compromised by the lack of convergence of their results and their utility is, therefore, doubtful. For instance The Guide for implementing in Romania the concept of innovative cluster (2009) which, according to its authors, „offers a methodological and pragmatic basis for those wanting to transpose at an industrial scale the new concepts of development of innovative clusters” dedicate only 3 pages from the total of 91 to a simple and superficial presentation of the main phases of the formation of a cluster opposed to the complexity and coherence of the European documents. In a similar way, the most recent document identifying potential clusters (Clusters and Potential Clusters. A Mapping Exercise, 2010) uses as main method peer-workshops, whose subjectivity reflects in the results' inconsistency (55 clusters from which only 19 were validated) while it recommends the use of statistical methods for a further phase to formulate a coherent cluster policy. These documents fail to communicate correctly the content of cluster concept and moreover, they propose risk-taking approaches („it is necessary to define a Romanian concept for a common understanding and a unitary approach to the term”). The Guide for implementing in Romania the concept of innovative cluster, 2009, p. 88).

Table 1. Projects on cluster identification

Study/Project	Period	Methodology	Clusters		Type
			Industry	Localisation	
Competitive Advantage of Regions: Country Competitiveness Assessment, International Center for Entrepreneurship Studies	1998	Regional indicators: – The concentration of interconnected industries, – SME's strategy, – network of suppliers and buyers, – regional competitiveness	– software – ship constructions – wood products – manufacturing		
Small Enterprise Clusters for Local Development in Transition Context: the case of Romania	1999	National indicators and Italian experience: – the identification of traditional industries – territorial concentration of companies – definition of industrial district	– wood products – manufacturing – textiles – ceramics		“proto-districts”
Supply-side Strategy for Productivity, Competitiveness and Convergence between the CEECs and the EU – Romania Case Study	1999	Surveys and interviews connected with: – the identification and localization – dynamics, strategies and performance of companies – dynamics, strategies and performance of cluster – the role of local and regional institutions	– ceramics – software	– Alba – Bucharest	“proto-clusters”, “emergent clusters”
Virtual Clustering Identification and Dissemination of Strategic Territorial Planning Best Practices for Certain Countries of Danubian and Southern Europe, INTERREG II C CADSES	1999-2001	Indicators: – regional and national turnover for industry; – percentage of employment in industry in the total employment; – bigger yearly growing rate in industry than the total average; – new SMEs creation above the average; – a significant number of organizations/ institutions with competencies for developing economic infrastructure and/or which provide professional service/training for local companies.	– printing-editing – ready-mades – wood and furniture – manufacturing – ceramics	– Harghita	“potential clusters”
Industrial Cluster Development, INTERREG III B CADSES	2003-2004	National indicators: – specialization – territorial concentration – competitiveness County indicators: – industrialization rate – specialization index	– textiles – wood – manufacturing, metal working – textiles, software – software	– Bacău – Mureş, – Braşov – Timiş – Cluj – Bucharest	“potential clusters”

West-East Industrial Development: Industrial Districts Relocation Processes: Identifying Policies in the Perspective of EU Enlargement, FP5, EU	2001-2004	Indicators: – territorial concentration – great number of SMEs – inter-firm networks in interconnected industries	– clothing-textiles – shoemaking	– Banat Crișana Arad Timișoara	“emergent clusters”
Clustering and Upgrading Romanian Automotive Suppliers, Cooperation Agreement between Romanian and Flemish Government	2003-2004		– vehicles	– Argeș, Brașov, Sibiu	“clusters of local suppliers”
Cluster Identification and Development Strategies in Bihor-Hajdu-Bihar, Phare CBC 2005 Romania-Hungary	2005-2008	Local indicators: – sectorial structure (CAEN rev.2) – number of employees – turnover for 2004-2006	– software, – traditional food industry	– Oradea	“crossborder potential cluster”
Clusters and Potential Clusters in Romania, Romanian Government, Ministry of Economy and German Government (GTZ)	2009-2010	Identified clusters – regional peer-workshops Validated clusters – cooperation and usage of innovative services	– confections, shoemaking, construction materials, food industry – vehicles, software – wine industry, ceramics – geothermal energy – food industry – vehicles – electrotechnics – ship constructions	– Bucharest – West – Center – North-West – North-East – South-West – South – South-East	“potential clusters” “clusters”

Obviously there is no need to create a Romanian concept, the clusters' worldwide success in numerous countries spare our efforts in this direction. A common understanding would be indeed useful and could have been already ensured by recent analysis (interviews, surveys, peer-reviews, peer-workshops), while the unitary approach would be possible through the elaboration of a common methodology for cluster identification.

### **Public clusters and regional development policy**

On the other hand the regional development policy, applied since the end of the 1990's has led to the development of public clusters, represented by:

- Industrial parks „P”
- Scientific and technological parks „S”
- Free zones „L”
- Less-favoured areas „D”
- Industrial restructuring and economic growth potential areas „R”
- Assisted areas „A”
- Business incubators „I”.

All are based on fiscal incentives for companies which decide to settle in. Industrial parks (48) have some successfull stories, although the evaluation reports elaborated till now underlined important structural deficiencies in terms of: location, design, inadequate structures, development based on invested funds and not on market demand, lack of managerial experience, unclear legislation. The great number of industrial parks will inevitably determine the decline of some of them as the public policies are meant to help the development of the viable ones. Very few (5) scientific parks, have a remarkable theoretical potential to become genuine clusters being based on relations between innovating companies, universities and research centers. Practically the chances for developing clusters of this type are reduced by the small percentage of research-development expenses in GDP (generally of less than 1%). The negotiations to adhere European Union on the competitiveness policy chapter of the Acquis obliged Romania

to give up incentives granted for less-favoured areas and free zones. A great part of them were withdrawn since 2004 and the last less-favoured areas in the initial total of 36 are planned to disappear in 2010. Economic and social benefits determined by the statute of free zone or less-favoured area are controversial. „R” areas delimited in 2001 were privileged by the concentration of PHARE funds and of those from the national budget but there is no follow-up evaluation of the effects of financial support and the results are modest. That is the reason why The Group of Applied Economics (GEA) considers that if competitiveness is the main objective of both regional and industrial policy, then the public authorities should earmark funds for supporting natural instead of public clusters which did not prove their effectiveness in terms of economic competitiveness although they heavily benefitted from investments. On the other hand, the authorities' opinion continues to be in favour of developing public clusters. ARIS (Romanian Agency for Foreign Investment) president declared in 2009 that the development of some projects of major investments depends on the creation of industrial parks.

### **Cluster Initiatives and Regional Development**

Since 2005 four cluster initiatives were promoted as instruments for growing competitiveness through collective learning. A cluster initiative represents a „organised regional sectorial network among economic partners aiming at improving innovation performance and international competitiveness” (CLOE, Interreg IIIIC, p. 8). This is one of the most popular approaches for industrial policy at the European level. The advantages of cluster initiative refers to: shifting attention from individual companies towards local/regional productive systems; focussing on products of endogenous growth in contrast with efforts to attract foreign investments; stimulating social processes by encouraging interactions based on trust in order to grow knowledge flows among local partners to the detriment of interventions

based on financial facilities; and least but not last accentuating the role of public authorities as intermediate actors among companies and between companies and knowledge infrastructure.

Cronologically, cluster initiatives in Romania are: Transylvania Cluster – the first cluster IT in Romania with the headquarters in Cluj Napoca, formed in 2005 by five companies specialised on software products (AGS, AROBS, NetBRINEL, RECOGNOS, TRANSART). Their purpose is to apply together for European funds necessary for developing major projects. A second cluster initiative refers to Automotivest Timișoara founded in 2007 by 12 partners: The West Regional Development Agency, Chamber of Industry and Commerce Timișoara, Chamber of Industry and Commerce Arad, Timișoara City Hall, Arad City Hall, „Politehnica” University of Timișoara, Aurel Vlaicu University of Arad, Interpart Production SRL, Inteliform SRL, Neferprod SRL, Mahle Group Engine Components, Mechanical Processing Center Bocșa. The initiative supported by public authorities in the local and regional administration, technic universities, chambers of commerce and private companies have as main purpose „to facilitate the growth of the market efficiency for the members of the cluster type of network in the West Region automotive industry” (Regional Development Cluster Action Plan, City Hall of Timisoara, 2007). Astrico North-East (2007) is a textile cluster founded by Astrico North-East Săvînești and The Regional Development Agency North-East. The cluster is opened for new partners such as the Faculty of Textiles, Leather Engineering and Industrial Management of „Gheorghe Asachi” Technical University and other faculties of technology and applied arts of the „Al. I. Cuza” University of Iași. Their purpose is to develop a sustainable cluster based on science, in the context of the worldwide fierce competition represented by Chinese textile industry. Transilvania Furniture represents a cluster in the wood and furniture industry founded by one of the most competitive industrial producers in the sector from the Center Region, Mobex Târgu Mureş together with other 1,000 small companies in the industry of

furniture, wood processing and furniture accessories and components (2009). Its founders affirm that it is a regional cluster including producers from the neighbouring counties (Covasna, Brașov, Harghita, Bistrița Năsăud). In fact there are local concentrations of producers without displaying a regional cohesion.

### **Transylvania Cluster**

Cluj Napoca is known as a national center specialized in software industry, an industry that is registering in Romania the most rapid pace of growth at the European level whereas the ratio of IT graduates at 1,000 inhabitants is one of the biggest in the world (ARIS, IT sector profile, 2009). In 2008, over 50% of the revenues in this industry came from software products (system infrastructure, applications). IT industry in the North-West Region registers a high increasing tendency, tradition, growing investments, an important turnover and positive evolutions for consultancy and software (The Regional Development Agency North-West, Socio-economic analysis, 2005). In this favourable national and regional context a group of specialised providers in IT&C products and services from Cluj which totalize at present approximately 460 experts founded „a big virtual HighTech company” (source: internet site for cluster presentation). The common threats and also the common opportunities represented the main motivation to found the IT cluster in a moment in which „Cluj Napoca was to be promoted as a Romanian Silicon Valley” (The analysis of innovation needs in North-West Region, RDA North-West, 2005). IT&C companies made „a common front so as to be able to benefit of big contracts which overpassed the capacity of production for each separate company and to fight against unwanted practices such as headhunting and leakage of confidential information” (The analysis of innovation needs in North-West Region, RDA North-West, 2005). In the context of an increasing competition for limited resources, especially limited IT human resources, companies need projects to respond their common interests. The five companies

that founded the IT cluster are leaders on the national market in providing business solutions, applications and are certified as partners by multinational companies such as Microsoft or IBM. The cluster represents though „a synergy of resources, knowledge and technologies with the mission to become the first East-European provider of software services”, what demonstrates the existence of a cluster strategy clearly formulated and supported by partners. The declared objective of the companies within the cluster is to enter new markets by a greater power of negotiation compared to big clients (IBM, HP), so one of the reasons of this cluster initiative would be the internationalisation. The five partners with strong research-development departments, offering assistance for the start-up companies and training address several growing domains such as banking, telecommunications, sport, media, project management, investments, insurance. Based on trust relations among these companies are structured on “cooperation” principles, meaning cooperation for great projects and competition for the smaller ones. Cooperation reflects itself in the cluster strategy and competition in the individual strategies of each company. Trust, shared values, attitudes and identity as elements which shape the social environment reflect themselves in the management style of the cluster materialized by a management council led by turns by the presidents of the partner companies, consequently suggesting an advanced managerial culture. Local innovative and entrepreneurial atmosphere strengthen the cluster by creating new companies and concentrating specialised labourforce. Business incubator founded in 2006 inside Tetarom I Industrial Park („Transylvania – Equipments and Advanced Technologies produced in Romania”) is destined especially to software companies. Nowadays the incubator hosts 12 companies being far from satisfying the local demand for IT company development (a second business incubator is to be founded – Săptămâna clujeană, 2 March 2010).

The motivation to turn Transylvania Cluster into a “story of success” is supported by the way in which cluster budget was

formed, each company contributing by a certain percentage of the revenues obtained as a cluster member, what suggests that ethics are a fundamental dimension for the cluster. Cluster’s name suggests the regional origins of member companies on the one hand and their contribution to create a regional identity on the other hand. Counting on cooperation, interaction and strategic alliances, companies have as an objective to create common and compatible methodologies, a common marketing campaign insuring for them a solid position on the market. A second reason for the foundation of this cluster is to obtain collective efficiency by intensifying externalities. Transylvania Cluster is at the same time a network based on ethics, discouraging headhunting and corporate espionage practices and encouraging in exchange the maintenance of a good reputation and the strengthening of cluster affiliation feeling. It is a network based on innovation inside which companies are knowledge transmitting channels and origin sources for knowledge synergies. The cluster has a high national and international visibility, an endogenous potential based on research and innovation and its development strategy is matching that of North-West Region intending to become an „innovative region” (REGIS, RDA North-West, 2005) inside which Cluj plays the role of a competitiveness pole.

## **Automotivest Association**

Automotivest Association established its objectives in the Action Plan for Regional Clusters Development: to develop networks of partners and providers for automotive industry in the West Development Region; to provide broker activities between Romanian and foreign companies in technological area; to develop a competence center; to contribute to information diffusion regarding research-development and to technological transfer; to create and support educational programmes and training programmes in the automotive industry; to facilitate the participation of companies to national and international fairs and exhibitions; to develop support activities for initiating collaboration projects among

companies and between them and institutions. On its turn the Regional Development Agency West participated at FP7 project „WeSteer – Support actions for the emergence of a research-driven automotive cluster in West Romania” in order to create the proper institutional framework for transforming the industrial agglomeration in a competitive cluster (Regional Development Cluster Action Plan, City Hall of Timișoara, 2007).

Most of the studies dedicated to clusters identification do not mention the existence of a potential cluster in the automotive industry for the West Region, except for the most recent study, Cluster Mapping Exercise, elaborated in 2009-2010, which mention two clusters in this region: one for automotive and the second one for software. In a similar way, the Strategical Concept of socio-economic development of Timișoara area mentions the companies in the automotive industry (Lisa Draxelmeier, Siemens Automotive, Delphi Packard, Kromberg & Shubert, Valeo Assembly) as being the ones which through total investments contributed to the development of local economy and the growth of competitiveness. The potential cluster for automotive is mentioned in the report „Benchmarking Study of European Automotive Clusters” from 2005 as it included the companies: Continental AG, TRW Automotive as providers of auto parts, Siemens Automotive (software) and Alcatel (telecommunications) and totalised approximately 1,000 employees in the automotive industry. Two recent studies of the Regional Development Agency West make reference to two industries with a potential to form two regional clusters: IT and automotive. The two clusters represent interconnected industries, in the sense that in the West Region, the offered IT&C services are used especially by the automotive industry, car companies being the main clients of software providers. Automotive industry has the potential to form a regional cluster due to its advantages (RDA West, 2008, p. 58): geographic location, business environment, industrial tradition, research-development potential, complementary industries. Although there are also disadvantages

(utilities cost, human resources fluctuation), Automotinvest is mentioned as a successful cluster programme by Policy Report Romania 2008 on the European Clusters Observatory website. The cluster is formed by several key-companies such as: Continental Automotive Products, TRW Automotive Systems, Kromberg & Shubert, all of them listed in the top of exporting companies by the Chamber of Commerce and Industry Timișoara. The „gate-keepers” role, meaning actors that generate innovation based on the local and external knowledge environments (Graf, 2010) is played by the „Politehnica” University that organises master programmes in collaboration with Siemens and Continental Automotive Products companies. The cluster of automotive is an emergent cluster of evolutionary type (with endogenous and science and technology-based development potential) which however has not reached a critical mass of companies interrelated through competence and cooperation relations. Consequently, one of the objectives of Automotinvest in 2009 is to grow the number of regional providers with 5%. The development potential of this cluster comes from cooperation networks existing among industrial companies, universities and the center for technological transfer which generates technological and innovative synergies. These are accentuated by the tight connection between the IT and the automotive industry.

## North-East Astrico

In the North-East Region, the textile and clothing industry is remarked, represented by the most powerful concentration of big companies (Vastex Vaslui, Siretul Pașcani, Rifil Săvinești, Romalfa Câmpulung Moldovenesc, Bucovina Rădăuți, Jatex Botoșani), which tends to become the defining element for regional industrial specialisation (Geografia României, V, 2005). The regional specialisation index in textile and clothing industry reaches a value of 23.3% in the total of industrial companies in the North-East Region (The analysis of economic tendencies

in the North-East Region, RIS Project, RDA NE, 2006, p. 17).

The later industrialisation of Moldavia (compared to Transylvania, Banat, the center of Muntenia) promoted especially chemical industry as a branch generating economic growth (Popescu, 2000). The lack of balance on the labourforce regional market caused by the more important offer for the segment of masculine workforce was counterbalanced by the development of textiles and clothing industry addressing especially to female population. The specialisation in this industrial branch represented at the beginning of the 1990's an attractive element for foreign investments that were producing in the lohn system. A chance of survival on a short term, the lohn system interrupted the value chain textiles-clothing by stopping the demand of clothing industry for the Romanian textile industry and contributing on a long term to the its decline. Largely, this type of modest investments in terms of capital and infrastructure of production exploit the low cost of labourforce. They do not represent growth engines for the host economy, but, in time they may become transfer sources for knowledge and generate entrepreneurial spin-off. In spite of these potential positive consequences, lohn system considered a form of economic neocolonialism, became unpopular after 2000 and its percentage reduced considerably in the national production. Ten companies of textiles and clothing in the North-East of the country (Rifil Yarn factory - is the most important producer of threads for clothing in the East Europe plus other 9 companies of knitting and clothing from knitted fabrics) together with the Regional Development Agency North-East, „Gheorghe Asachi” University - Faculty of Textiles and Leather Engineering Iași (until 1990 the only one with this profile in the country), The Research-Development National Institute for Textile and Leather and a consultancy company took the initiative of a partnership having as purpose „to assimilate new products with a greater added value” (source: the website of cluster initiative). The objectives of this cluster initiative are mentioned in detail in the Regional Development Plan NE 2007-2013. They refer to

internationalisation by opening new marketplaces, reducing costs of transactions through a common marketing and a common trade policy, growing competitiveness through joint investments in technology, creating a common identity by commercialising products through a personal brand. The cluster member-companies have a total capacity of production of three million pieces of knitting fabrics per year (Regional Development Plan NE 2007-2013). The textile cluster is known at national and European level, being mentioned by the project InovCluster 2009 (textile cluster in NE including the counties of: Bacău, Botoșani, Iași, Neamț, Suceava, Vaslui) and by European Cluster Organisation Directory 2010.

Astrico North-East is one of the partners of the North-East Regional Laboratory for Innovations made up by AsviLoc+ project (Agencies Supporting Value of Innovation systems in regional and LOCal economies) that will run in the 2009-2012 period. It is a programme financed by European funds (SEE Programme) in order to grow the role of NE RDA and of other development agencies in 12 countries to create regional systems for innovations and to form a transnational network for innovation. One of the AsviLoc+ objectives is to encourage new associative structures by creating a regional textile cluster. During the workshop „Innovation phenomenon in the business environment from the North-East Region / Romania” (27 May 2010) the intention to create a regional textile cluster formed by RDA NE, Astrico NE, „Gheorghe Asachi” University Iași - Faculty of Textiles, Leather Engineering and Industrial Management and InovCluster, was announced. This is the way through which, in fact, the textile cluster Astrico NE accesses EU structural funds meant to finance on an average term cluster activity. Astrico NE is an evolutionary emergent cluster with an endogenous potential for development, based on a specialised network of suppliers and producers with an evolving partnership with knowledge providers (university and research institute) and an active catalyst actor in promoting innovation (RDA NE).

Cluster weaknesses refer to the lack of a critical mass (according to CLOE, 2004,

Interreg IIIC the critical mass is insured by 30-50 companies and stakeholders/institutions) capable to confer resistance for the cluster initiative in front of exogenous shocks and of other types of pressures which may make the region vulnerable through the loss of resources and competencies. A business incubator to offer consultancy for start-up companies in the textile and knitting industry would contribute through its major role in the learning process and knowledge transfer to stimulate the local and regional entrepreneurial spirit, conferring a greater stability to business environment. Common actions at the cluster level (labourforce training, technological development, marketing) lead to the achievement of a collective efficiency which defines the cluster strategy. Common actions to accentuate the relational potential and to stimulate information and knowledge flows within the cluster are missing. Cluster companies focuss on cooperation, more than on competition, although the two mechanisms insure equally the functionality of cluster. The secondary role of competition in the cluster strategy jeopardises the development of an innovative business environment and in the end the quality and the intensity of cooperation. In addition, the long term strategy is not clear for the moment: as the leading structures and self-financing mechanisms are missing the cluster opportunities of success are reduced.

### **Transilvania Furniture Cluster**

Transilvania Furniture Cluster is formed by companies from the wood and furniture manufacturing industries in the counties of Brașov, Bistrița-Năsăud, Covasna, Harghita și Mureș being promoted by one of the most successful producers at national level: Mobex Târgu Mureș.

„The concentration of wood processing companies in Mureș county is unique for the whole country and is already a naturally created cluster. It does not function however as a real one and we want to create an institutional body to help companies to interact” (Daniel Egri, Mobex General Manager, internet site of the cluster

initiative). In Târgu Mureș area there are over 1,000 companies which produce furniture, subassemblies, exploit and process wood or provide ironmongery. Other prerequisites which contribute to cluster development are forestry resources, renown companies and financing possibilities through Regional Operational Programme or the Operational Programme „Competitiveness and Economic Growth”. The existence of a potential cluster in the furniture industry located in the center of the country was mentioned by two international studies: VICLI (1999-2001) in Harghita county and INCLUD (2003-2004) in Mureș county. The objectives of the cluster initiative are linked to the foreign competition and the economic recession which imply new approaches, among which the local strategic cooperation among companies is the most efficient for diminishing the negative effects of recession. Cluster activities have in view to create a data base, a product catalogue, to participate jointly to fairs and exhibitions, common trainings, to have common marketing and promotion policies. In other words cluster strategy has as major objectives: to reduce costs by a greater power of negotiation on the market and access to a specialised labourforce basin; internationalisation by entering new marketplaces; technological development by knowledge transfer between university and industry. In 2009, 15 companies and institutions signed up a memorandum of strategic association, including industrial companies (Mobex Târgu Mureș, Mobinarta, Forex, Dinexim, Mobila Dalin, Ferochim, Comodex Handicraft Cooperative, Niraj Ace Brad Prod, Demiart), institutions of education and research (Transylvania University Brașov – Faculty of Wood Engineering (the only faculty in the country with this profile), National Institute of Furniture Brașov), authorities (Economy Ministry, The Chamber of Commerce and Industry Mureș), catalyst institutions (Employer Association of Forestry from Romania, The Romanian Furniture Manufacturers Association).

The organisation of the cluster includes several competences and decision-making levels being in fact the most elaborated cluster management system among all above

mentioned clusters. Long term strategy and policy is formulated by the management council formed by the most important stakeholders from which a president is elected. Internal and external communication and development process coordination are activities in the responsibility of the Administrative Office while the consultancy services and the relations with authorities are the job of the advisory committee. Informal work groups study the present needs of the cluster and the services it provides. The financing for the cluster initiative is based on the contributions of participating companies and on accessing EU structural funds. This last source of finance led in fact to the geographic fragmentation of the cluster. In this way the most recent cluster initiative is partially overlapping the same regional area being as in the previous case the result of the need to access European funds.

Pro Wood Brașov-Covasna, 2010, is financed through a FP 7 project run in the 2008-2010 period, which includes small and medium size enterprises from the wood processing and furniture industry organised in an association (ASIMCOV), Transylvania University Brașov - Faculty of Wood Engineering, the County Council of Covasna, providers of specialised services, consultancy and management companies. Being part of an international project, Pro Wood cluster initiative followed the characteristic steps for the process of cluster formation, with actions in the five defined fields by de CLOE 2004 Interreg IIIC: information and communication, education and qualification, cooperation, marketing and internationalisation. The cluster is mentioned as a „four leaves clover” model (Guth, Coșniță, 2010): industrial companies, authorities, education and research, catalyst institutions. The first step to form the cluster was the partners identification and the implication of specialised companies of services and consultancy from Finland, France and Germany. The evaluation of the present situation evidenced clusters needs: using IT solutions, marketing and strengthening the cooperation between schools and companies. The action plan established after identifying the problems to which cluster confronts

includes the foundation of a cluster marketing department, common participation to fairs, common programmes of training in schools and companies, technological audit sessions made by university professors for the cluster member companies.

## Conclusions

Cluster initiatives developed in Romania belong to two categories: industry-driven (Transylvania IT, Astrico Nord-Est, Transilvania Furniture) and government-driven (Automotivest). Lately this category generated a subcategory of cluster initiatives financed by European funds (Pro-Wood Brașov-Covasna, North-East regional textile cluster). Cluster initiatives are in different phases of evolution and have both similarities and differences. Transylvania IT cluster remarks itself by some elements which will ensure its continuous success: the participative financing which made of the cluster initiative an efficient mechanism for collaboration accentuating partners linkage, cluster management involving partners responsibility which become in this way „clusterpreneurs”; and least but not last the consensus upon objectives and the elaboration of a long term strategy. Cluster development capacity either through endogenous growth (the formation of new companies through entrepreneurial spin-off) or through external growth (attraction of new companies) seems problematic as on a long term may become a development limitation. Automotivest is in a full period of expansion by including new members and its interaction with the IT cluster in Timișoara assures at least part of its success. Although it has a gap regarding cluster organization and is formed by key-companies, knowledge and catalyst institutions, it does not have „clusterpreneurs” dedicated to cluster management. Astrico North-East is a cluster initiative which solved at least on a short term the finance problems by accessing EU funds and its development is part of the innovative regional policy which represents a guarantee of the governmental support. Transilvania Furniture excels in a hierarchical organisation and

leadership clearly differentiated in terms of competences. ProWood cluster access to European funds may represent a way to develop and reconstruct the initial regional territory of Transilvania Furniture. A common element for all cluster initiatives refers to the lack of a set of indicators to monitor performance and fulfill objectives. The experience of European clusters made clear the fact that the absence of performance monitoring reduces partners determination to collaborate and their confidence in the success of the cluster (The Cluster Initiative Greenbook, 2003).

## Bibliography

- Albu, M 1998, 'Technological Learning and Innovation in Industrial Clusters in the South' in *Paper Series* no. 7, University of Sussex, Science Policy Research Unit, 50 p. (electronic work).
- Amin, A 2000, 'Industrial Districts', in Sheppard, E & Barnes, T (eds.), *A Companion to Economic Geography*, Oxford, Blackwell, p. 149-168.
- Becattini, G 1989, *Modelli locali di sviluppo*, Il Mulino, Bologna.
- Becattini, G 1990, 'The Marshallian Industrial District as a socio-economic notion', in F Pike, G Becattini & W Sengenberger (eds.), *Industrial Districts and Inter-firm Cooperation in Italy*, International Institute for Labor Studies, Geneva.
- Becattini, G 1998, *Distretti Industriali e Made in Italy: Le Basi Socioculturali del Nostro Sviluppo Economico*, Bollati Boringhieri, Torino.
- Brenner, T 2004, *Local Industrial Cluster Existence, Emergence and Evolution*, Routledge, London, 243 p.
- Brusco, S 1982, 'The Emilian Model: Productive Decentralization and Social Integration', in *Cambridge Journal of Economics*, 6, p. 167-184.
- Brusco, S 1986, 'Small Firms and Industrial Districts: the experience of Italy', in D Keeble & E Wever (eds.), *New Firms and Regional Development in Europe*, Croom Holm, London.
- Brusco, S 1990, 'The Idea of the Industrial District: its genesis', in F Pyke, G Becattini, W Sengenberger (eds.), *Industrial Districts and Inter-firm Cooperation in Italy*, International Institute for Labor Studies, Geneva.
- Camagni, R 1991, 'Local "milieu", uncertainty and innovation network: towards a new dynamic theory of economic space', in R Camagni (ed.), *Innovation Network: Spatial Perspectives*, Belhaven Press, London.
- Chapman, K 2005, *From "growth centre" to "cluster": restructuring, regional development and the Teeside chemical industry*, Environment and Planning A, 37, p. 597-615.
- Chiesa, V & Chiaroni, D 2005, *Industrial Clusters in Biotechnology. Driving Forces, Development Processes and Management Practices*, Imperial College Press, London.
- CISA 1998, 'Avantajul competitiv al regiunilor' *Evaluare a competitivitatii de tara*, Author.
- Cooperation Agreement between the Romanian and Belgium Government 2003-2004, *Clustering and Upgrading Romanian Automotive Suppliers*.
- Cuc, S & Tripa, S 2006, 'Clustere in industria de textile, confectii si piele din Romania' in *Analele Universitatii din Oradea*, Oradea.
- de Arcangelis, G, Ferri, G & Padoan, PC 2003, 'Firms' Clustering and SEE Export Performance. Lessons from the Italian Experience' in *Working Paper*, University of Rome.
- Etykowitz, H 2002, *The Triple Helix of University-Industry-Government. Implications for Policy and Evaluation*, Institutet for studier av utbildning och forskning, Stockholm.
- European Commission 2002, 'Regional Clusters in Europe', *Observatory of European SMEs*, no. 3, European Commission, 61 p.
- European Commission 2009, *EU Industrial Structure Performance and Competitiveness*, Author, Luxembourg, 204 p.
- European Union 2001-2004, 'West-East Industrial Districts (WEID)', *5th Program Framework*, Author.
- Feldman, MP, Francis, J & Bercovitz, J 2005, 'Creating a Cluster while Building a Firm: Entrepreneurs and the Formation of Industrial Clusters' in *Regional Studies*, 39, 1, p. 129-141.
- Ferrari, RM 1999, *Small Enterprise Clusters for Local Development in Transition Context: the Case of Romania*, Bocconi University, Milan.
- Feser, E & Bergman, E 1999, 'National Industry Cluster Templates: A Framework for Applied Regional Cluster Analysis' in *Regional Studies*.
- Flores, AD 2003, *Geographic Information System: the Economic Clusters of the Industrial Sector in Mexico*, paper presented at the Workshop of EADI on Clusters and Global Value Chains in the North and the Third World, Novara, Italy.
- Ganne, B & Lecler, Y(eds.), 2009, *Asian Industrial Clusters. Global Competitiveness and New Policy Initiatives*, World Scientific Publishing, 601 p.
- Grabher, G 1993, 'The weakness of strong ties. The lock-in of regional development in the Ruhr area' in G Grabher (ed.), *The Embedded Firm*.

- On the socio-economics of industrial networks*, Routledge, pp. 255-277.
- Guth, M 2004, Innovation, social inclusion and coherent regional development: A new diamond for socially inclusive policy in regions, Discussion Paper on the Conference on Territorial Cohesion, Galway.
- Guth, M & Coșniță, D 2010, *Clusters and Potential Clusters in Romania. A Mapping Exercise*, Report, 53 p.
- Harrison, B, Kelley, MR & Gant, J 1996, 'Innovative Firm Behaviour and Local Milieu: Exploring the Intersection of Agglomeration' in *Firm Effects and Technological Change*, *Economic Geography*, 72, 3, pp. 233-258.
- Interreg IIC – Cadses, 1991-2001, *Virtual Clustering Identification and Dissemination of Strategic Territorial Planning Best Practices for Certain Countries of Danubian and Southern Europe* (VICLI).
- Interreg IIIB – Cadses 2003-2004, *Industrial Cluster Development (INCLUD)*, Author.
- Interreg IIIC – Cadses 2006, *Cluster Management Guide, Guidelines for the Development and Management of Cluster Initiatives*, CLOE – Clusters Linked over Europe, Author.
- Ionescu, V 1999, *Supply-side Strategy for Productivity: Competitiveness and Convergence between the CEEs and the EU – Romania Case Study*.
- Ketels, C 2003, 'The Development of the Cluster Concept – Present experiences and Further Developments', Paper prepared for the NRW Conference on Clusters, 25 p.
- Ketels, C, Lindqvist, G & Solvell, O 2006, 'Cluster Initiatives in Developing and Transition Economies' in *Center for Strategy and Competitiveness*, Stockholm, 42 p.
- Krugman, P 1991, *Geography and Trade*, MIT Press, Cambridge, Ma.
- Kuchiki, A 2005, 'Theory of a Flow Chart Approach to Industrial Cluster Policy' in *Discussion Paper no. 36*, Institute of Developing Economies, 43 p.
- Kumar, S 2005, 'Development of Industrial Cluster. A Study of Indian Small-scale Industry Cluster' in *MPRA paper no. 171*, 52 p.
- Lundvall, BA(ed.) 1992, *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, London.
- Majocchi, A 2000, 'Are Industrial Clusters Going International? The Case of Italian SMEs in Romania' in *Working Paper no. 12*, Insubria University, Faculty of Economics.
- Markusen, A 1996, 'Stick places in slippery space: a typology of industrial districts' in *Economic Geography*, p. 293-313.
- Marshall, A 1890, *Principles of Economics*, Macmillan, London.
- Martin, R & Sunley, P 2002, 'Deconstructing Clusters: Chaotic Concept or Policy Panacea?' in *Journal of Economic Geography*, 3, 1, p. 1-53.
- Maskell, P 2001, 'Towards a Knowledge-based Theory of the Geographical Cluster' in *Industrial and Corporate Change*, 10, 4, Oxford University Press, p. 921-943.
- Ministerul Economiei, Directia Generala Politica Industriala si Competitivitate 2009, Ghid pentru implementarea in Romania a conceptului de cluster inovativ, Author, 91 p.
- Ministry of Economy, Trade and Industry 2005, *Industrial Center Study Report*, Industrial Cluster Study Group, Author, Japan, 98 p.
- Murray, R 1996, 'Italy – a Sectoral Approach' in H Rush & M Hobday et al. (eds.) *Technology Institutes: Strategies for Best Practice*, International Thompson Business Press.
- Nelson, RR (ed.) 1993, *National Systems of Innovation: A Comparative Analysis*, Oxford.
- OECD 1999, *OECD Proceedings. Boosting Innovation: The Cluster Approach*, 418 p.
- OECD Local Economic and Employment Development 2004, 'Cluster of Enterprises and the Internationalisation of SMEs: the case of the Romanian Region of Timișoara', Summary Report of the Seminar held by the OECD Local Economic and Employment Development, Timișoara, 24 May, 18 p.
- Paslaru, D 2004, 'Catre o politica industriala bazata pe aglomerari economice competitive – Cluster (II)' in *Identificarea clusterelor emergente in Romania*, Grupul de Economie Aplicata, 10 p.
- Pencea, S 2007, 'Promovarea clusterelor industriale inovatoare, componenta a strategiilor de crestere a competitivitatii pe pietele globale' in *Revista Economica*, 2, p. 145-154.
- Pencea, S 2007, 'Defending Clusters against Critics' in *Romanian Economic and Business Review*, 2, 4, p. 22-26.
- Pinch, S & Henry, N 1999, 'Paul Krugman's Geographical Economics, Industrial Clustering and the British Motor Sport Industry' in *Regional Studies*, 33, 9, pp. 815-827.
- Piore, M & Sabel, C 1984, *The Second Industrial Divide: Possibilities for Prosperity*, Basic Books, New York.
- Phare CBC 2008, *Identificarea si dezvoltarea de clustere in Euroregiunea Bihor-Hajdu Bihar*, Author, 118 p.
- Porter, M 1998, *Clusters and the New Economics of Competition*, Harvard Business Review, Boston.
- Pyke, F & Sengenberger, W 1992, *Industrial Districts and Local Economic Regeneration*,

- International Institute for Labor Studies, Geneve.
- Rosenfeld, SA 2002, 'Creating Smart Systems. Guide to Cluster Strategies in Less Favored Regions' in *European Union – Regional Innovation Strategies*, 36 p.
- Saxenian, AJ 1985, 'The Genesis of Silicon Valley', in P Hall & A Markusen (eds.), *Silicon Landscapes*, Allen & Unwin, Boston.
- Saxenian, AJ 1994, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Harvard University Press.
- Scorsone, EA 2002, *Industrial Clusters: Enhancing Rural Economies through Business Linkages*, Southern Rural Development Center, 23, p. 1-8.
- Scott, AJ & Storper, M 2003, 'Regions, Globalization, Development' in *Regional Studies*, 37, 6-7, p. 579-593.
- Seo, JH 2006, 'Regional Innovation System and Industrial Cluster: Its Concept, Policy Issues and Implementation Strategies', *National Workshop Sub-National Innovation Systems and Technology Building Policies to Enhance Competitive SMEs*, Beijing, China.
- Sforzi, F 1990, 'The Quantitative Importance of Marshallian Industrial Districts in the Italian Economy' in F Pike, G Becattini & W Sengenberger (eds.), *Industrial Districts and Inter-firm Cooperation in Italy*, International Institute for Labor Studies, Geneva, p. 75-107.
- Solinas, G 1982, 'Labour Market Segmentation and Workers Careers: the case of the Italian Knitwear Industry', *Cambridge Journal of Economics*, 6, p. 331-352.
- Sölvell, O, Lindqvist, G & Ketels, C 2005, *The Cluster Initiative Greenbook*, Bromma Tryck ab, Stockholm, 94 p.
- Storper, M 1997, *The Regional World: Territorial Development on a Global Economy*, Guilford Press.
- Storper, M & Walker, R 1989, *The Capitalist Imperative. Territory, Technology and Industrial Growth*, Basil Blackwell, New York.
- The Cluster Competitiveness Group 2002, *Cluster-based Policies*, Author, Barcelona, 16 p.
- Tappi, D 2003, *The New Marshallian Industrial District. A Study on Italian Contribution to Theory and Evidence*, Max Planck Institute for Research into Economics, 21 p.
- Viitamo, E 2001, 'Cluster Analysis and Forest Sector – Where are We Now?' *Interim Report, International Institute for Applied Systems Research*, Laxenburg, Austria, 45 p.
- von Hofe, R & De Bhatta, S 2004, 'Method for Identifying Local and Domestic Industrial Clusters using Interregional Commodity Trade Data', *The Industrial Geographer*, 4, 2, p. 1-27.
- Yamawaki, H 2001, *The Evolution and Structure of Industrial Clusters in Japan*, The International Bank for Reconstruction and Development, The World Bank, 29 p.
- Yingming, Z 2010, 'Analysis of Industrial Clusters in China', *Science Paper*, 245 p.
- Waits, MJ 2004, *Advantages of the Industry Cluster Approach to Economic Development*, Atlanta forum.