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## **STRUCTURAL CHANGE IN INDUSTRIAL CLUSTERS – SCENARIOS AND POLICY IMPLICATIONS**

**Abstract:** In the paper, the drivers and mechanisms of structural change in clusters were analyzed, and scenarios of clusters' future development were proposed, together with policy implications. Two scenarios of clusters' future development were built, namely: (1) hierarchization of relationships, and specialization among clusters of similar industrial profiles; and (2) concentration in clusters of higher value adding activities, and dispersal of lower value adding activities from clusters to locations with cost advantages. The scenarios were based on differentiation between the company level and industry level factors of cluster change, and the assumption was that prevalence of either of those determinants would impact the confirmation of adequate scenario. Moreover, the policy implications for regional government and for cluster participants were formulated for each future variant. The results of the paper are intended to form strategic foundations for programming regional development, and to influence companies' choices in the context of cluster change.

**Key words:** Clusters, scenarios, cluster change, regional policy.

### **Introduction**

Industrial clusters are a focus of regional and national policies directed at innovativeness and international competitiveness of enterprises. Contemporary theoretical explanations of cluster competitiveness are based on case studies of successful regions where a number of patterns of industry organization have developed. The patterns (such as Italian district, "hub and spoke" district or "satellite" district) are analyzed according to the structure of network relationships among enterprises and institutions of environment, density of linkages with external environment, the role of public support, *etc.* to provide a benchmark for policies. The advantage of such approach lies in its power to highlight the factors and mechanisms of cluster competitive

advantage at one specific phase of development. However, few studies consider the phenomenon of cluster dynamics – its incremental and evolutionary transformations as well as disruptive shifts that lead to structural changes in entire industrial agglomerations. Those changes can result either in decline or in adaptation and further development. Understanding those processes is conducive to programming intra-regional development at the level of industries and sectors. The aim of this conceptual article is to analyze drivers and mechanisms of structural changes in clusters, and to propose scenarios of clusters' future development together with policy implications. The discussion will be based on literature review, including theoretical explanations of structural change in clusters and cross-country empirical findings. The proposition was formulated that structural changes observed in clusters provide foundations to plot the two scenarios of their future development. These are: (1) scenario of relationship hierarchization and specialization among clusters with similar industrial profiles; (2) scenario of concentrating higher value adding activities in clusters and dispersing lower value adding activities to locations with cost advantages. In the first section, the meaning of structural change was discussed in the context of cluster structural characteristics. The second section explains drivers and mechanisms of cluster change at the company and industry levels. In the third section, the outcomes of changes are proposed in the form of scenarios, and the policy implications follow.

## 1. Structural change in clusters – meaning and indicators

Structural change refers to shifts in the core characteristics of clusters due to either evolutionary processes or disruptive events. It should be differentiated from temporary cyclical problems of national or global economy, as it is of long-term and durable nature. In order to explain the change in cluster structure, it is critical to identify cluster structural characteristics in terms of elements that constitute this phenomenon, and then to discuss possible modifications of those elements. For further empirical research to serve both scientific and policy purposes, it is also important to point to some possibly quantitative indicators measuring those structural elements and signaling their alterations.

Clusters are geographical concentrations of firms in one or a limited number of adjacent industries that form co-operative and competitive networks together with the institutions of environment [European Commission 2002; Porter 1998]. Cluster phenomenon and concept cover earlier concepts of industrial district, specialized industrial agglomeration or industrial production system [European Commission 2002; Vanhaverbeke 2001]. Considering the above definition, there are two structural characteristics of cluster that constitute this phenomenon, namely:

- 1) spatial and industrial concentration that implicates a regional specialization [Belandi 2001; Krugman 1991; Piore, Sabel 1984; Porter 1998], and

- 2) network relationships among the companies, and between companies and institutions of environment, such as universities, local and regional government, *etc.*, that develop a common stock of knowledge [Asheim, Isaksen 2003, pp. 36-40; Brusco 1982; Markusen 1996; Porter 2001; Putnam 1995; Pyke, Sengenberger 1992; Saxenian 2000].

The above features not only constitute cluster phenomenon, but also provide benefits that underpin competitive advantage of cluster companies, relative to those located out of industrial agglomeration. They also demonstrate different characteristics as to the measures that describe their current status and their changes.

Spatial concentration of related business activities that develop a regional specialization brings the benefits of low transportation costs, as well as external benefits of access to physical infrastructure, to qualified employees and to information that spills over, often spontaneously, becoming the club good in a specific regional agglomeration. Altogether, these benefits are agglomeration effects, derived rather from geographical proximity of a critical mass of companies and organizations than from their planned, purposeful strategies. Spatial and industrial concentration is also a basis for identification of the cluster, based on the objective, quantitative measures, such as location quotient and input-output analysis. Changes in those indicators reflect the dynamics of industrial specialization in the region, in terms of both, shares of the leading industries, and changing composition of the industries related by input-output relationships.

Network is a set of co-operative and competitive relationships with selected partners [Johanisson 1998]. Most research studies point to internal networking as a necessary condition for cluster success [Asheim, Isaksen 2003, pp. 36-40; Brusco 1982; Eraydin, Armatli-Köroğlu 2005; Markusen 1996; Molina-Morales, Martínez-Fernández 2006; Porter 2001; Putnam 1995; Pyke, Sengenberger 1992; Saxenian 2000]. However, internal linkages must be supplemented by international or global networks to maintain competitiveness by knowledge exchange, and to avoid technological lock-in [Glasmeier 1994; Sørensen 2005; Sornn-Friese]. Networking activity, opposite to agglomeration effects, represents a strategic and purposeful behavior of companies who search for active exploitation of spatial concentration benefits [Gancarczyk, Gancarczyk 2002]. Joint vertical and horizontal activities of companies provide for network economies of scope and scale. First of all, however, deepened collaborative relationships are necessary for knowledge diffusion and creation [Asheim, Isaksen 2003, pp. 31-34; Vatne, Taylor 2000], while information spillovers were possible as unintended, side effects of agglomeration. Network relationships are conducive to knowledge transfer and to creation, and thus to innovative activity. As such, they are currently considered the most important factor of cluster competitive advantage, since the impact of agglomeration factors weakens under digitalization and globalization of economic activity.

Research studies identified a number of attributes of networks that may serve their identification and description of their dynamics, namely *institutional thickness*, *density*, and *embeddedness*.

Institutional thickness [Amin, Thrift 1994] denotes existence of a critical mass of companies in adjacent industries and environment institutions in the cluster, and as such, it forms a basis for network formation. Institutional thickness can be measured by the number of cluster participants in different categories and by dynamics. Dynamics of those figures would reflect an aspect of changing characteristics of regional networks. Another important trait is density, *i.e.* a high number of linkages among cluster entities [Putnam 1995]. Those linkages are mutuality and trust based. As so called untraded interdependencies, they represent low mobility and possibility to replicate [Storper 1995]. Embeddedness of a network means that its relationships are rooted in the social relations of the region [Granovetter 1985]. Possible approximations of embeddedness in business networks include: the share of regional, relative to external, links in business contracts and ties; durability of relations; and complexity of transactions implemented. Shifts in those measures would reflect the dynamics of network embeddedness.

Consequently, the structural change in clusters consists in considerable and durable transformations of their structural characteristics (Table 1), as indicated by:

- level of spatial and industrial concentration;
- industrial profile (the composition of leading industries);
- system of internal relationships (roles of companies, hierarchization or heterarchization of relationships) and of external linkages.

The indicators mentioned above describe a specific state in time, however, when tracked by historical analysis in different points of time, they can serve as change indicators. As proposed in the Table 1, those indicators can further be researched with the use of specific measures.

Table 1

Structural change in clusters – indicators and measures

Structural characteristics	Indicators of status and change	Measures
Spatial and industrial concentration	Level of spatial and industrial concentration	Location quotient
	Industrial profile (the composition of leading industries)	Input-output analysis
Network relationships	Institutional thickness	Number of cluster participants
	Density	Number of linkages among cluster entities
	Embeddedness	Share of regional relative to external linkages in contracts and ties of cluster participants Durability of relations Complexity of transactions implemented

Source: Own elaboration.

## 2. Drivers and mechanisms of cluster change

We purposefully use the term ‘structural change’ instead of ‘cluster evolution’ or ‘life cycle’, since the former we treat as an observable outcome of both evolutionary processes and breakthrough events. Clusters are complex, embedded, adaptive systems, and, due to this complexity, they normally feature inertia, undergoing slow and incremental modifications. Some of those shifts are dependent on technology and product life cycle that determine the evolution of cluster production systems as well. In the long run, however, those evolutionary processes are accompanied by rapid events which are either of external, uncontrolled nature, or result from strategies of cluster participants and regional authorities. In programming regional development, it is critical to differentiate between uncontrolled and controlled factors to support decision-making of regional authorities and cluster participants. The focus of this article is on controlled and semi-controlled factors, *i.e.* those that can be influenced by the main cluster stakeholders. Further, those factors and mechanisms, in terms of specific processes leading to changes, will be discussed at the company and industry-levels.

### 2.1. Drivers and mechanisms at the company level

At the company level, the two critical drivers of cluster change are internationalization and digitalization [Biggiero 2006; Zucchella 2006]. Due to concentration of specialized supply, clusters were always directed at internationalization by exporting. However, the core of the cluster was localization of the production system and competence within the agglomeration, resulting in a relatively self-sufficient system. Since the late 80., however, the companies have passed from exporting to internationalizing the production process, in search of cost advantages, developing technology and supplying local markets by manufacturing on the spot [Propriis de Menghinello, Sugden 2008]. Information technologies facilitate international co-ordination of logistics and production. They also enable technology development projects by replacing face to face communication and geographical proximity with electronic communication. International strategies of the cluster lead companies represent major mechanisms of cluster change due to the drivers of internationalization and digitalization. Strategies of the leader companies are cost or differentiation driven, and they are based on the choice of industrial profile and on relocation of economic activities out of the region [Gancarczyk 2010].

The cost strategies of internationalization prevail and are directed at efficiency. Their major options are selective and replicative relocation.

Selective relocation consists in moving parts of the company value chain activities out of the source cluster. This relocation normally concerns lower value adding activities, such as assembling, manufacturing of standard components, distribution, and processing. Higher value adding activities, such as R+D, marketing, advanced

manufacturing, product and process design and engineering, as well as co-ordination of the entire value chain, remain in the cluster. Selective relocation of the cost strategy can be implemented through the following options: (1) outsourcing of raw materials and components, (2) inward processing, (3) foreign direct investments [Biggiero 2006; Semlinger 2008]. Replicative relocation of the cost strategy consists in moving the entire value chain of a specific good out of the source region. Those options strongly impact internal structure of clusters, both in terms of level of spatial and industrial concentration, industrial profile, and system of network relationships [Biggiero 2006; Zucchella 2006] (Table 2). They can be adopted as single choices or combined in strategies of individual cluster companies.

The structural change can have either positive or negative implications, and may lead either to decline or to renewal of the agglomeration. Selective relocation generally allows for keeping the basis of competitive advantage within the source cluster, as the most knowledge intensive industries and associated knowledge are retained, while moving out lower value adding activities. Initially, it means loss of some of the current business connections and disappearance of some business activities. Eventually, however, it provides the opportunity for renewal of the cluster industrial profile towards more technology intensive activities, which are difficult to imitate and sustainable. Such positive effects were observed both in the Montebelluna clothing industry, Italy [Samarra, Belussi 2006] and in Silicon Valley, USA [Saxenian 2007]. Replicative relocation in the short run is cost efficient. In the long run, it undermines the competitive advantage of the source cluster, as it poses the threat of knowledge leakage, and it finally strengthens rival imitators. If replicative relocation is a massive activity, exercised by many cluster companies, it may cause a decline of the cluster. These negative consequences were confirmed in the case of silk garment manufacture near Como Lake [Alberti 2006] and of clothing industry near Val Vibrata, Italy [Samarra, Belussi 2006].

Table 2

The options of the cost strategy of internationalization and their impact on structural change in the cluster

Area of Change \ Option	Selective relocation			Replicative relocation
	outsourcing of raw materials and components	inward processing	foreign direct investment (selected operations)	foreign direct investment (the entire value chain)
Change in concentration level	X	X	X	X
Change in industrial profile	X	X	X	X
Change in system of relationships	X	X	X	X

X – impact of the factor considered as plausible.

Source: Own elaboration based on [Belussi 2006; Biggiero 2006; Lorentzen 2008; Samarra 2005; Saxenian 2007; Zucchella 2006].

The differentiation strategies of internationalization are directed at achieving uniqueness through technological innovations. Companies choose among the following options (Table 3):

- 1) focus on the global niches for products that require a high level of competence in the area of design, marketing and engineering (for instance, branded Italian consumption goods) [Biggiero 2006];
- 2) development towards related industries with a higher technology level and product complexity (the examples include: transition to production machinery and engineering in ceramic tile industry in Emilia Romagna, Italy; transition to packaging machinery and materials in the food industry of Parma and Milano, Italy; transition to software, environment technologies and biotechnology from computer hardware, electronics and precision instruments in Silicon Valley and Cambridge) [Samarra, Belussi 2006; Zucchella 2006];
- 3) selective relocation, consisting in moving some parts of value chain, mainly those connected with R+D, to other locations, either by outsourcing technology development projects or by foreign direct investment [Lam 2007; Waxell, Malmberg 2007].

Those option can either be adopted as single choices or mixed in individual strategies.

The differentiation options are less radical in changing the structural characteristics of the cluster. They enable securing the cluster knowledge and developing it into higher order competitive advantage, by restructuring either into technologically advanced industries or to branded specialty products. Those options do not significantly alter the concentration level; however, some of them have the power to transform the system of network relationships, and to change the number of cluster participants and their relationships. Selective relocation in the area of R+D maintains the value chain, except for this specific activity, while gaining the external knowledge to develop tech-

Table 3

The differentiation options of internationalization strategy and their impact on structural change in the cluster

Area of change \ Option	Focus on global niches	Development towards higher technology industries and complex products	Selective relocation in the area of R+D	
			outsourcing of R+D projects	direct investment in the area of R+R
Change in concentration level				
Change in industrial profile		X		
Change in system of relationships		X	X	X

X – impact of the factor considered as plausible.

Source: own elaboration based on [Belussi 2006; Biggiero 2006; Lorentzen 2008; Samarra, Saxenian 2007; Zucchella 2006].

nology, which is conducive to cluster further development and renewal [Lam 2007; Lorentzen 2008; Saxenian 2007]. Focus on global niches and on development towards more advanced industries is directed towards exporting, while maintaining the value chain inside the cluster. These options provide development prospects, however their weakness lies in an inward focus and in a limited infusion of external knowledge, which may lead to lock-in and further decline. In order to avoid this threat, cluster companies normally combine this option with selective relocation of R+D.

When relocating to other destinations with cost and technology advantages, cluster companies need to consider the problems of choosing competent co-operators, and of co-ordinating a new value chain out of the original location. The choice of destinations is largely determined by the assumption that adequate competence base is placed in other clusters of similar industrial profiles. Another important factor is a propensity to replicate the value chain and network co-ordination typical of the original cluster, with the aim of achieving similar agglomeration and network benefits as in the source cluster [Gancarczyk, Gancarczyk 2011]. Companies search for partners with related industrial profile that demonstrate cognitive, organizational, social and institutional proximity [Boschma 2005]. In consequence, the international networks of clusters with similar characteristics arise [Lorentzen 2008; Proprius de Menghinello, Sugden 2008; Saxenian 2007].

## **2.2. Drivers and mechanisms at the industry level**

As clusters are geographical concentrations of companies specialized in a specific area of activity, they undergo changes typical of industries they represent. Here, we are interested in the evolution of industry structure in terms of division of roles in the value chain, combined with geographical organization.

Among the drivers of industry evolution, there are product and technology life cycles which impact the industry structure, its value chain, the roles of industry participants, and eventually the location of activities, which is relevant for change in clusters. An important mechanism of cluster evolution, due to product and technology life cycle, is the rise and development of modular production networks. Modular production network is a production organization system based on companies' specialization in specific value chain activities of a complex product, and their horizontal integration within this specialization. Initiated by the USA companies, it was developing since the 80. through the 90. Product and technology life cycle in industries such as electronics and computer production led to modularization of product engineering and manufacturing, based on standardization and flexible technologies enabling short-series and customized supplies, as exemplified in Silicon Valley [Sturgeon 2002, 2003]. In result, specific modules (functional elements of a complex product) can be designed, engineered, innovated, and manufactured individually by separate companies. These modules can then be combined into a product, thanks to the standardized interface. Beside the life cycle determinant, other determinants of modular production networks include: (1) efforts of innovative cluster



companies to focus on innovations and to split out manufacturing which was vulnerable to changes in demand and in technology; and (2) the need to co-ordinate global manufacturing chain by establishing effective relationships between the lead, innovative companies and their suppliers, dealing mainly with manufacturing. The modular pattern is not limited to high technology industries, such as electronics and ICT, but it is also observed in the production of automobiles, pharmaceuticals, food and beer, *etc.* The mechanism of the rise of modular production networks is sketched in Figure 1.

As presented in Figure 1, technological factors such as modularization of product engineering and standardization of modules (*de facto* standards, CAM, CAE, CAD, SCM) stimulated the two concurrent trends – toward deverticalization (vertical disintegration) and outsourcing by branded original equipment manufacturers (OEMs), and toward horizontal integration (mergers and acquisitions) of companies dealing with manufacturing, process engineering and logistics [Baldwin 2007; Gangnes, van Assche 2004; Lau 2011]. Those processes resulted in industry organization based on two groups of companies, namely: (1) lead companies, dealing with product innovations, design, engineering and marketing; and (2) contract manufacturers (system integrators, maestros) focusing on process innovation, manufacturing and logistics, and co-ordinating the value chain, including other suppliers. Contract manufacturers are responsible for co-ordinating the global value chain of their own facilities and that of other suppliers; their “locational” choices are prevalently based on cost advantages. The overall effects are further concentration in clusters of higher value adding activities by lead companies dealing with product innovations and marketing, and dispersal of lower value adding activities towards locations with cost advantages [Sturgeon 2003]. Cluster agglomeration of innovative activities persists, as spatial network effects are conducive to knowledge creation, including technology development. Agglomeration and concentration benefits prove less important in the case of simple manufacturing activities. Modular production networks strongly impact all the important areas of cluster change, such as concentration level, industrial profile, and networking relationships.

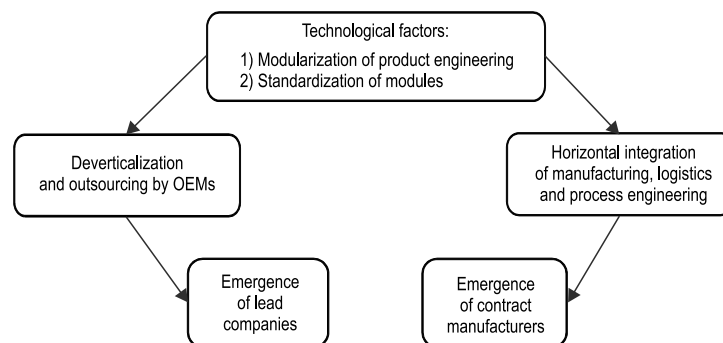


Figure 1. Mechanism of the rise of modular production networks

Source: Own elaboration based on [Gangnes, van Assche 2004; Lau 2011].

### 3. Scenarios of future development and policy implications

Considering the complexity, as well as the long-term and uncertain nature of cluster change, scenario planning is the appropriate method of analysis. Scenario method should be adopted to analyze long-term and uncertain future developments and their impact on a specific object. This analytical method should be differentiated from forecasting or foreseeing, as it is not directed at identifying one vision of the future, but rather at presenting plausible alternative views, called scenarios. Plotting alternative, contrasting views and their consequences not only enables decision-makers to develop contingency plans and then react to unpredicted events, but also it forms a ground for proactive policies to stimulate positive changes [Johnson *et al.* 2011, pp. 51-54]. As such, scenario planning forms a strategic basis for programming regional development. Scenario methodology includes identifying main drivers and cause-effect processes, *i.e.* mechanisms of change. In the next step, the plausible and logical combinations of those drivers and mechanisms need to be presented in the form of scenarios [Faulkner, Bowman 1996]. In the preceding sections of the article, drivers and mechanisms of cluster change at the company and industry levels were presented. Here, two alternative scenarios of cluster future development will be proposed, with some policy implications. This is a long-term view, and it is assumed that at least ten-year time span would be needed for verification of the proposed scenarios.

#### 3.1. Scenario of hierarchization and specialization among clusters

This scenario has its foundations in the drivers and mechanisms of cluster change at the company level. As stated earlier, in response to the drivers of internationalization of economic activity and digitalization, cluster companies assume cost or differentiation strategies with specific options, in which relocation is a prevailing choice. Relocation, if selective and limited to only a part of value chain, will lead to restructuring towards more complex and technology advanced activities, while retaining local networks and their knowledge, and preventing clusters from imitation. Selective relocation, both cost and differentiation based, enables renewal of the cluster and maintaining its competitive edge, provided that the companies source the external knowledge in their international networks, and that they are not locked into the internal technology and business relationships. The threat of decline appears when the cluster companies massively adopt replicative relocation, moving the entire value chain out of the region for the cost benefits. Clusters are knowledge repositories and innovation generators. When breaking their current relationships, they lose the part of experience and routines which belonged to their networks in the source cluster, but which did not belong to them individually. This undermines the competitive advantage of individual companies and of their source cluster, resulting in its decline. More-

over, cutting linkages in the source region and disclosing a comprehensive business information to new partners exposes the companies, and finally the entire cluster, to imitation from rival firms. Beside relocation, there are also inward directed strategies, such as strategies of global niche and of internal development towards more knowledge intensive industries. Such strategies of differentiation are attractive and efficient in the medium-term; however, in the long-run they may pose a decline threat due to locking in. This threat can be dealt with by combining the inward options with the external ones, such as selective relocation of R+D.

As relocation strategies prevail, they will shape the future development of clusters. An important factor in this context will be the choice of destinations where to source some value chain activities. There is specificity in choosing business partners by cluster companies, which influences the international structure of clusters' relationships and forms a basis for the scenario of hierarchization of international relationships and specialization among clusters (Figure 2).

In this scenario, it is assumed that companies from more competitive clusters will divide work in the value chain with companies from developing clusters which will lead to international specialization of clusters with similar industrial profiles (buyer-supplier relationships). As buyer clusters are normally assumed to have superior knowledge and market power versus cluster suppliers, the relationships will emerge as hierarchical.

This scenario raises the following policy implications for regional authorities and for participants of the source clusters relocating their activities:

- The preferable form of internationalization is selective relocation of activities with retaining those which are knowledge intensive.
- The inward focus strategies of internationalization (by exporting) can bring the lock-in threat, and it is recommended that they are combined with selective relocation.
- Sourcing external knowledge is conducive to cluster renewal and to competitive advantage in the long-term, this is why more embedded, deepened networking relationships with international collaborators are advised – to enable knowledge exchange and creation.

There are also implications for developing clusters, acting as suppliers in the international activities of more advanced counterparts:

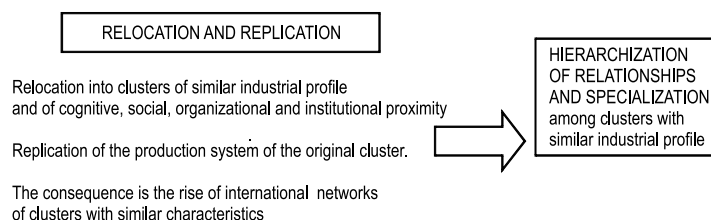


Figure 2. Scenario of hierarchization of international relationships and specialization among clusters

Source: Own elaboration (Figs. 2, 3).

- It is recommended that possibly higher value adding activities are invited to the developing regions (R+D centers, engineering laboratories, more advanced manufacturing).
- Regional governments need to work on embedding the foreign partners by long-term contracts and by more complex projects in order to enable knowledge absorption by their cluster companies. It is advised that regional authorities act as active mediators and accelerators of those relationships.

### 3.2. Scenario of concentration and dispersal

The concentration and dispersal scenario responds to the drivers and mechanisms of cluster change at the industry level. The drivers of product and technology life cycles were stimuli for the emergence of modular production networks. This scenario offers an alternative view on clusters' structure and on geographical destinations of relocated activities, relative to the scenario of hierarchization and specialization. Due to modularization of design, engineering, and manufacturing, the industry structures are increasingly composed of two groups of global, large firms, namely: (1) the lead companies dealing with higher value adding activities (product innovations, product engineering and design, marketing), and (2) contract manufacturers focusing on lower value adding activities (manufacturing and co-ordination of smaller suppliers, process innovations and process engineering, logistics). The mechanism of cluster change consists in concentrating the innovative, higher value adding activities in clusters, and in moving lower value adding activities from clusters to dispersed locations with cost advantages (Figure 3).

Being spatial concentrations, clusters will persist only as centers of generating innovations. Spatial proximity will retain its value as a condition for knowledge creation, as the latter requires deepened network relationships and direct interaction. Less knowledge intensive activities do not require such conditions, due to their standardization and to IT technologies enabling efficient co-ordination. There is, however, a threat to the established clusters with innovative lead companies. As they lose direct control and contact with manufacturing, they also lose the ground for improvements and innovations in this area. This possibly would prevent more radical product innovations, as there is a feedback relationship between product and process innovations.

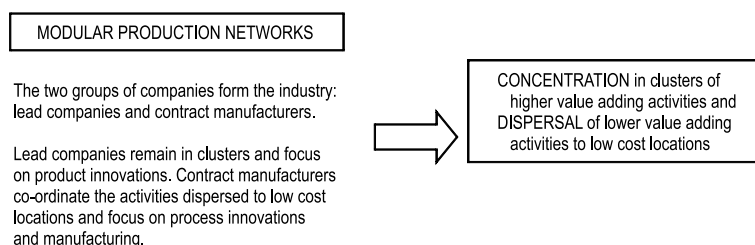


Figure 3. Scenario of concentration and dispersal

Moreover, when lead companies transfer their parameters of products and technologies to contract manufacturers, they become vulnerable to technology leakage and imitation by suppliers, who enjoy the advantages of scale and scope in manufacturing and logistics. As for the international relationships among clusters, heterarchical links will be established by highly innovative agglomerations for the purpose of technology development and keeping pace with others. The relationships with dispersed locations, mainly in developing countries, will be highly hierarchical and restricted to standardized production. Companies from lower cost locations supplying to contract manufacturers will be at a disadvantaged position.

Considering the above scenario, the following policy implications for regional authorities and participants of source clusters can be formulated:

- The changing structure of clusters, as prevalingly composed of innovating companies, and as knowledge and innovation centers, should be considered when shaping the image and marketing of the region. This regional image can attract other specialized high quality business services for the lead companies, outsourcing contracts and foreign direct investments from other knowledge-center clusters, with a resultant snow-ball effect.
- It is recommended that the process innovations implemented by contract manufacturers are retained in the region and integrated by collaborative links with product innovations, exercised by lead companies. Public involvement in stimulating such projects, in the form of public-private venture funds, could be a tool in this regard. Such measures, aimed at retaining major product and process innovations in the cluster, would prevent the threat of knowledge leakage and imitations.

Regional governments and cluster participants of the regions absorbing investment in manufacturing from the contract manufacturers should consider the following implications:

- In the industry structure based on the lead companies and contract manufacturers, the weakest bargaining power is possessed by small and medium-sized companies (SMEs) from the lower cost locations. Such companies experience cost and margin pressures from contract manufacturers who globally co-ordinate suppliers competing for business. Moreover, there are minor opportunities for those suppliers to absorb knowledge and technology from their buyers, as they implement standardized and reduced activities. In order to avoid this turf and reduced relationships, it is advised that both, local companies and regional governments, direct efforts to engage the external investors and outsourcing companies in more long-term oriented activities. Possible solutions include: developing more complex projects locally, creating favorable infrastructural and institutional environments, and establishing durable contracts with investors. The proposed actions may attract specialized business service providers to the region, up-grade local business technology, and, generally, develop human capital. These factors represent important locational criteria for business investment and for contracts of more durable and value adding nature.

- In order to work-out more durable relationships with external buyers and investors, it is recommended that regions develop their own specialization to attract more investments in specific industries. This could possibly reverse the dispersal trend into building new clusters, actively participating in the international division of work.

## Conclusion

In this article, the drivers and mechanisms of structural change in clusters were analyzed, and two scenarios of clusters' development were proposed with policy implications. The contribution of this paper was to structure the information and to draw conclusions from conceptual papers and from empirical findings on the changes undergone by developed clusters in market economies, and to form propositions as to their future development within at least next ten years. The literature reviewed referred to the changes and processes observed in clusters since the late 80. till the present; however, these changes cannot be fully generalized as prevalingly they are based on case studies, and few comparative studies exist. This calls for a more empirical research on cluster change in general; however, comparative and long-term studies would be specifically relevant. Considering the limitations of to-date empirical research as well as the uncertain and long-term character of the problem, the scenario method was chosen to process the information from literature and to form conclusions. Based on to-date research, we can point to the two opposing views on cluster future development, as reflected in the scenarios of (1) hierarchization of relationships and specialization among clusters with similar industrial profiles, and (2) concentration in clusters of higher value adding activities, and dispersal of lower value adding activities from clusters to locations with cost advantages. Another input from the article is to differentiate between company and industry-level factors and mechanisms of cluster change. The two scenarios are based on the assumption that either company-level or industry-level factors will prevail in shaping the future of industrial agglomerations. The first scenario is based on the company-level, while the second, on the industry-level determinants. Moreover, the results of the paper are some policy implications for regional government and for cluster participants. Overall, the paper intends to provide some strategic foundations for programming regional development and company strategies in the context of clusters.

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