

Cluster identification: policy implications of the evolution of the cluster concept in the context of globalisation and European enlargement

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Introduction

The concept of “cluster is an example of semantic uncertainty in economics. While the evolution of the concept and the existence of a number of synonyms and correlated terms is quite intriguing, the operational impact of this uncertainty will seriously influence the policy maker.

This paper starts with the problem of cluster identification (paragraph 1), surveying the variations in different definition in different countries. The differences in the cluster identification process have some impact on policy set-up. In the second paragraph the focus is on cluster-based policy and on the role of competitiveness in cluster-based policies. Some suggestions as to the characteristics of the policies are briefly summarised. In the third paragraph, we try to focus on the evidence for increasing inter-firm relationships between clusters in different countries with special reference to EU15-European New Member and Candidate States. The final section looks at how increasing evidence for strict productive relationships can also be accompanied by alternative cluster to-cluster relationships.

1. The problem of cluster identification: definition and methodologies

There are several alternative definitions of an industrial cluster, but they share the basic idea that an industrial cluster is a number of firms grouped together. Alternative definitions place different emphasis on the structure assumed by these agglomerations of firms.

Many contributions have been provided in the literature and it is useful to survey a taxonomy of all the definitions. In Bergman et al (1999)² and in Whalley – Den Hertog (2000)³ there are useful examples of these taxonomies: they position every cluster definition or cluster-related definition in a continuum of different theories.

² Bergman et al. (1999)

³ Whalley J. – den Hertog P. (2000)

Behind the idea of cluster lies the Marshallian idea that a group of firms is more than the mere sum of firms. This is because the group of firms (cluster) is the result of economies of agglomeration, which drive the entire system towards specialisation.

The definitions can be summarised⁴ according to different criteria:

a) the levels of analysis: in OECD (1999) we find reference to the **macro level**, the **meso level** and the **micro level**. The macro level can be identified as the whole national (or regional) economy, where the focus is on links between industries. The meso level can be identified at the branch-industry level where inter-industry and intra-industry links are considered. Finally, the micro-level is where the firm is considered together with its network of suppliers, i.e. inter-firm relationships are considered. Moreover, industrial clusters may encompass⁵ different industries/sectors (horizontal dimension), different steps of a complete production process (filieres – vertical dimension) and different sectors sharing only some of their capabilities (lateral dimension).

b) the typology of industrial development: clustering is a common framework for the **industrial district set-up** (along with knowledge spillover, innovation diffusion and support from the socio-economic environment), for **development poles** or development blocks (clustering is the outcome of an expanding industry, which may also be external, pushed by economies of scale), for the idea of development based on industry cluster⁶ or on the idea of value-chain industry cluster⁷ (where industries are linked by buyer-supplier relationships, common technologies, common buyers, common labour pools but also, along the whole chain, by connections with research centres and institutions supporting firms' networking)⁸, located for example at regional level (regional industry cluster);

c) the diffusion path of innovation and technological change implied by industrial complexes (where links between firms developing new technology and firms using technologies⁹ prevail), technological systems (network of firms and institutions that trade

⁴ Largely based on Whalley J. – Den Hertog P. (2000)

⁵ Jacobs – de Man (1996)

⁶ Enright (1997)

⁷ OECD (1999)

⁸ Enright (2001)

⁹ Dreier et al. (1999)

technology)¹⁰ and sectoral systems of innovation and production¹¹ (a complex system of interacting agents linked to each other by a knowledge base, factors of production and demand and characterised by a number of intricate relationships).

The traditional viewpoint on clusters was mainly focused on the following definition:

“Clusters are **geographic** concentrations of **interconnected** companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialised inputs such as components, machinery and services, and providers of specialised infrastructure. Clusters also often extend downstream to channels and customers and laterally to manufacturers of complementary products and to companies in industries related by skills, technology, or common inputs. Finally, many clusters include governmental and other institutions – such as universities, standards-setting agencies, think tanks, vocational training providers, and trade associations – that provide specialised training, education, information, research, and technical support.”¹²

This is the comprehensive definition of cluster provided by Michael Porter, the business economist who introduced the cluster concept in economic analysis. The overlapping of different definitions is self-evident, due to the fact that some of these terms have often been interchanged.

Originally, the concept of a cluster was a descriptive tool to distinguish between industrial sectors and subsets of aggregated industrial sectors, connected by vertical and horizontal relationships¹³. It was possible to distinguish between clusters and other concepts, e.g. (the Italian industrial district: industrial districts are strictly connected to the territory where they are located. In this sense, it is possible to state that in industrial districts there is a strong interdependence among enterprises, institutions, human and social capital. Within industrial districts, firms’ organisation is positively influenced by Marshallian economies deriving from the territorial concentration of enterprises. There is also a direct link between localisation economies and firms’ performance within the

¹⁰ Carlsson – Stankiewicz (1991)

¹¹ Malerba (2000)

¹² Porter M.(1998)

¹³ Porter M (1990)

industrial district. Furthermore, the district is fully described by the firms' and the whole territorial potential.

The concept of cluster, on the contrary, does not necessarily rely on a specific territorial dimension: if the focus is on interdependencies between firms or on their own innovative interactions, then a cluster might be spread over an entire country or over different countries. The patterns of innovation are spreading increasingly throughout the world and the transmission of knowledge in a globalised economy is obviously the result of intricate interconnections, not easy to capture in a mere territorial dimension. There is also a strand of analysis that is studying clusters regardless of the territorial dimension. Even though geographical proximity may be important for the transmission of knowledge and for embedding firms in the same business, the new information technology allows clustering independently of geographical proximity. Moreover in some cases, the concept of cluster does not work properly: for example cluster-based policy in the case of large projects may run into serious problems in the implementation phase due to the peculiarities of demand emerging from the project¹⁴.

In more recent works there has been an increasing switch to the idea of a **regional cluster**, even in the literature stemming from Porter's analysis. A **regional cluster is a geographic bounded concentration of interdependent firms**¹⁵. The interdependence and the idea of cluster itself implies that the concept refers to a large number of firms and employees and to a small number of connected industrial sectors.

Further ideas of regional concentration of firms might be considered as an evolution of the cluster concept¹⁶. When more organised co-operation arises between firms, stimulated by trust, norms and conventions, it is possible to define a "**regional innovation network**", and when the co-operation is mainly focused on knowledge development and diffusion, it is possible to define a "**regional innovation system**" or "**learning regions**".

In the context of the identification process, the main question is whether is it possible to identify a list of possible characteristics of an industrial cluster.

¹⁴ Alderman N. (2004)

¹⁵ Rosenfeld S.A. (1997)

¹⁶ In the following, European Commission (2002)

In Isaksen (1997)¹⁷ we find the following characteristics: concentration of firms in particular sectors and localities; several firms in the dominant industry or industries; firms form local production networks (firms work as a large production unit exploiting external economies); organisational flexibility; in some cases (industrial districts) there is a link with social and cultural conditions; innovation is a possible additional characteristic of clusters.

In Enright and Roberts 2001¹⁸ emphasis is on: association of firms and organisations involved in a value chain, producing goods and services and innovating; synergies between firms and organisations sharing information and knowledge; collaboration on R&D, innovation, commercialisation and marketing; a variety of firm size in the same cluster.

Again in Rosenfeld (1997), interesting work has been carried out in order to define a new set of descriptors to better describe and compare the “power of clusters to produce synergy and identify gaps”. Twelve factors are needed to measure the economic efficiency of a cluster: R&D capacity, knowledge and skills, human resource development, proximity of suppliers, capital availability, access to specialised services, machine and tool builders, intensity of networking, social infrastructure, entrepreneurial energy, innovation and leadership.

Further analysis¹⁹ has emphasised the territorial dimension of clusters and studies on regional clusters have emerged. **Industrial districts** are an example of territorial clustering where, along with the traditional external economies of a network of specialised small firms, important social and cultural links arise. It is well known that the Italian way of identifying industrial districts is widely considered a milestone in the studies on regional development. Even in the survey proposed by the Observatory of European SMEs, the pioneering work by Sforzi (1990)²⁰ is considered as a “standard reference”. Some authors do not agree with a full identification of clusters with industrial districts as in Sforzi F.–

¹⁷ Isaksen A. (1997)

¹⁸ Enright M.J. and Roberts B.H. (2001)

¹⁹ The following taxonomy is suggested by European Commission (2002)

²⁰ Sforzi F. (1990)

Lorenzini F. (2001)²¹: the main argument is that the industrial district is a clear evolution of the concept of industrial sector. Basically, Becattini suggests abandoning the industrial sector as a basis of analysis for industrial economics. On the contrary, the concept of cluster is relies heavily on the idea of industrial sector, in the sense that a cluster is essentially an industrial sector highly concentrated in a specific area.

The **Californian school** has emphasised the vertical disintegration of production chains which determines a flexible context in which the role of local labour markets in economic development is much increased . The **Nordic school** has focused on the process of learning innovation, which is sometimes pushed by local institutions and by codified and tacit knowledge often transferred in a regional context.

It is very difficult to summarise all the possible checklists of variables that could usefully be used to define a cluster. We would like to forward a possible operating definition.

A very simple one is as following: **in a given country (region), we identify a cluster when a relatively high concentration of firms arises in strongly interconnected sectors.** There are two different relevant components in this definition: the first is a territorial one (there must be a concentration of firms although it does not matter which level of aggregation) and an industrial one (there might be a leading sector, but focus should be on connections among sectors). Moreover, these subsets of firms are well able to implement networks with the rest of the economic system, particularly in the field of innovation. Thus, concentration of firms, interconnected sectors and innovative networks might be considered three efficient synthetic indicators for cluster identification.

The identification process often relies on statistical or other methods and an interesting summary is provided by the Observatory of European SMEs (2000)²². We can identify three different approaches²³.

²¹Sforzi F.–Lorenzini F. (2001)

²² European Commission (2002)

²³ Timpano (2004).

Table 1 – Cluster identification methodologies

Cluster identification methodologies	Countries
Methods based on the identification of local production systems, industrial districts or local labour markets. Specialisation indexes, relevance of SMEs, degree of co-operation and shared common culture	France Italy Norway Spain United Kingdom
Methods based on the detection of inter-industry link and the identification of main users and main suppliers	Finland Netherlands
Methods based on qualitative studies, interviews (sometimes supporting or supported by quantitative analysis)	Austria Denmark

2. Cluster-based policies in the perspective of improving competitiveness in Europe: set-up and evaluation

A regional cluster policy can be defined as a policy aiming to sustain existing clusters or to support the growth of clusters which are starting up. The focus of the regional cluster policy is neither the industrial sector *per se*, nor the individual firms, but the systems of firms, sectors and institutions involved in the cluster approach.

Setting up a regional cluster policy involves facing a variety of different problems, which are summarised in . Table 2.

Table 2 – Possible choices in cluster policies

MAP OF POSSIBLE POLICY CHOICES		
POLICY TARGETS	<i>Traditional clusters vs. innovative clusters</i>	<i>Picking the winners or stimulating potential clusters</i>
	<i>Local firms vs. external firms</i>	<i>Industrial complex around large firms vs. SME policies</i>
INSTITUTIONS	<i>Setting-up of institutions to manage cluster (cluster institutionalisation)</i>	<i>Enforcing of public institutions facilitating clusters</i>
TOOLS	<i>Firm- oriented policies (providing financial support) versus system-oriented policies (stimulating social processes such as the flow of knowledge²⁴)</i>	<i>Policies based on boosting innovation by means of financial support or other measures</i>

The taxonomy of cluster policies is not exhaustive, but it is possible to distinguish the policy targets, the set-up of institutions and the available tools. There is a relevant

²⁴ See European Commission (2002) and Boekholt and Thureauux (1999)

underlying distinction in cluster policies, based on the innovation content. There is much literature supporting the idea that the “regional dimension” of an innovative system has emerged as the consequence of the emphasis given to information sources external to the firm²⁵.

The policies supporting innovation can be surveyed on the basis of market failures (Lagendjik A. - Charles D., 1999). Market failures may arise at the informational level, in which case policies should foster information exchange and business services providing information. Failure might also arise from limited interaction between actors, and policies should react by pushing social and institutional networking (public-private-partnership). A further common cause of failure is the mismatch between knowledge and firms’ needs: in this case, links with universities may help in closing the gap. Finally there may be a government failure, which should be solved by implementing the regional governance of innovation policies.

The cluster approach applied to innovation policies should help to enforce two flows of information towards the regional cluster. The first is mainly internal to the cluster and might be characterised by joint financing of R&D. The second is external, towards the global economy where additional innovation might be bought and/or sold by firms belonging to the cluster. These flows are crucial in that interregional and inter-national co-operation must ensure that the local system is involved in the mainstream of the global innovation process. This is not an easy task, but certainly it is an additional objective for a cluster-based innovation policy.

More generally, the cluster approach should allow the regional system to move from more traditional policies based on infrastructure building and technological support to a more comprehensive policy trying to improve the environment in which firms and local actors operate.

The keyword for such cluster policies is the improvement of regional competitiveness. Just as we are aware that the definitions of industrial cluster are not homogenous and stable the economic literature, at the policy level it is similarly difficult to

²⁵ See Paniccia (2004)

give a complete framework of all possible alternatives. The relationship between cluster-based policies (boosting innovation) and improvement in competitiveness does exist but it is not robust.

The cluster approach to policy making obliges policy makers to enlarge the number of targets of the policy. It is often based on a bottom-up framework of intervention and is necessarily less focused than a traditional policy. For these reasons the method of evaluation of a cluster-based policy is much more complex and difficult to identify. Suitable indicators should be chosen to evaluate the policy, and a territorial rating might help to evaluate territorial improvements in relative terms.

Any evaluation process of cluster policies is largely influenced by the objective of the policy itself. Different grids of comparison have been provided, most of them aimed at evaluating the different typologies of sub-policies and activities implemented by clusters.

Firstly, the existence of a cluster policy has to emerge from analysis. As shown by a recent survey²⁶, most European countries do not have a proper regional cluster policy (apart from Belgium and Spain). Some countries have a national framework for regional policies (Austria, Germany, Italy, Sweden, UK and Hungary) while others adopt a national cluster policy (France, Luxembourg, Latvia, Lithuania, Slovenia). The other countries in the EU-27 do not have explicit cluster policies.

There are no clear regularities in cluster policies according to the three partitions, apart from the fact that top-down policies are implemented in the countries where the central government plays a relevant role and bottom-up policies are implemented where the regional government is the policy pivot.

We can identify three different approaches:

- an approach focused on innovation, adopted by Germany, Belgium, France, Sweden;
- an approach more generally aimed at the support of regional development and competitiveness (Italy, Spain, Austria)

²⁶ See Tomasetti (2004)

- an approach aimed at learning from successful and unsuccessful stories and a careful attempt at introducing cluster policies while bearing in mind that clusters are still too embryonic (new member states and candidate countries).

The following table is an attempt to reconcile the level of policy implementation with the level of performed activities on the basis of the classification used by ENSR Cluster Survey.

Table 3 – Policies and activities in industrial clusters

Activities performed by cluster organisations	Policies implemented to support regional development
R&D	Support research
Production	Firm-oriented support
Inputs	Support infrastructure, provide information
Training	Support recruiting and training
Marketing and sales	Attraction
Logistics	Support infrastructure
Government relations	Support collaboration

Along with evaluation of the performance, it is important to study the impact on the economic environment. This can be done by comparing objectives and results. It is worthwhile summarising the main objectives that seem to recur in cluster-based policies.

Table 4 – Cluster policy objectives and indicators of impact

Objectives	Indicators of impact (examples)
Economic development and structural change	Economic performance
Enhancing innovation	Rate of growth of innovation at the cluster level
Supporting research and training	Rate of growth of scientific production, patents and specialised skills
Infrastructure investment	Economic performance
Supporting entrepreneurship	Improvement of economic environment
Promoting networking	Rate of growth of connections and links between firms
Supporting cluster organisation	Increase in the quality of cluster management

The impact indicators above need to be precisely defined, to be used as tools for an impact evaluation on the whole cluster and not simply indicators of results.

As we can see in this brief survey, inter-cluster co-operation is neglected by policy set-up. The emphasis on the geographical aspect of clusters and the attempt to obtain a boost in regional innovation from the clustering approach (Mitra and Matlay, 2000) have oriented policies towards an “inward” approach. The “outward” approach emerges only when there is a need to push territorial marketing to attract new investors or when the process of internationalisation involves local firms in different ways. Nevertheless, the emphasis is on the need for competition with other clusters or potential clusters and not on the potential from competition.

3. Cluster-based economic systems and inter-firm (inter-cluster) productive relationships

An additional level of policy that must be considered concerns the support for co-operation between enterprises belonging to different clusters. The question is how far a public policy should support the idea of being open to other clusters operating in the same filière or in similar markets. Does it make sense in a globalised economy to provide incentives to co-operation between clusters?

There is an increasing number of connection initiatives between clusters in Central and Eastern Europe and in the EU15. They reflect the tendency of Western European countries to decentralise production to areas characterised by lower labour costs and more potential for flexibility.

Before discussing this point, it is useful to recall the possible motivations behind co-operation between firms belonging to different clusters or industrial districts. It will then be possible to discuss policy.

In order to clarify these points, it might be useful to give an example by looking at what is occurring between Western Europe (EU15) and New Member States (NMS). Trade between these two areas accounted for 230 billion Euros in 2003 on the export side (over a total amount of 2320 billion Euros exports) and 116 billion Euros on the import side. Poland, the Czech Republic and Hungary are mainly responsible for these figures. Trade volumes are increasing even though they are quite limited. However, it is necessary to

emphasise that exports to Western countries are mainly subcontracted products manufactured from materials supplied by the customers (lohn production). Thus, the exports to Western countries are not real exports of products, but exports of processing services.

In economic literature, there is a clear differentiation between the phenomena of inter-industry trade and intra-industry trade. Inter-industry trade concerns the trading of different goods produced by different sectors and each country will specialise in a fraction of these goods on the basis of the comparative advantage principle. Intra-industry trade, on the contrary, involves the trading of similar products between countries in both directions (exports and imports). The increasing integration of the economies will lead to an increase in intra-industry trade as a result of increasing returns to scale operating. In the economies that are unified (monetary unions or commercial unions) a model of coexistence of firms from different countries should prevail over a specialisation model; this result is controversial but in the long run it should prove to be true under the condition that countries are quite similar to each other. Otherwise, the most efficient one will prevail on the basis of the comparative advantage theorem.

If this result is robust, then we should not expect intra-industry trade between EU15 and NMS. Homogeneity will increase as part of the integration process and as cohesion policies are introduced, and the *acquis communautaire* will be completely implemented in NMS. An estimate of intra-industry²⁷ trade between Italy and NMS confirms that there is increasing evidence for this phenomenon.

The integration process between firms can be characterised by different typologies of relationships, in a continuum from mere trade integration (trade of goods) to the exchange of knowledge and technology.

²⁷ Ciciotti E. – F. Timpano (2004)

Table 5 – International integration²⁸

<i>International integration</i>	<i>Relationships</i>	<i>Measures</i>
<i>Trade</i>	<i>Trading of goods</i>	<i>Trade balance</i>
<i>Production (horizontal)</i>	<i>Providing productive capacity; production in global (global sourcing)</i>	<i>FDI; supply agreements (non equity); Bilateral trade balance (imports)</i>
<i>Production (vertical)</i>	<i>Basic supply; outsourcing; distribution networks</i>	<i>FDI; supply and joint venture; Bilateral trade balance (exports-imports)</i>
<i>Inter-industry</i>	<i>Backward and forward linkages</i>	<i>FDI; technological agreements and joint venture; Bilateral trade balance (exports-imports) invisible entries; technological balance</i>
<i>Technological</i>	<i>Knowledge exchange (projects, design, software, technologies)</i>	<i>Invisible entries; technological abulance</i>

The choice of international integration depends on firm size. Large firms usually implement FDI (greenfield or equity), while small firms are often obliged to make different choices, looking for productive co-operation.

There is increasing agreement to study the vertical integration among local productive systems and emerging countries by looking at the trade balance. Evidence of correlated increases in exports and imports should be explained by phenomena such as the productive passive transfer, i.e. a flow of exports from the district to the emerging country for intermediate goods and a flow of imports from the emerging country to the same district as final goods. In some cases, goods are directly exported from the emerging country²⁹.

In the case of Italy, for example, firms are moving increasingly towards Central and Eastern Europe: in less than twenty years the share of Italian firms with foreign equity participation in these countries over the total number of firms with foreign equity participation has increased from 1% to 28,8% with an increase in traditional sectors and a decrease in science-based sectors of this share. Moreover, only 35% of district firms are involved in greenfield foreign investment, and more than 60% of firms is involved in productive partnerships³⁰. This is obviously due to the Italian industrial structure, but the new international division of labour is often characterised by a concentration of sub-

²⁸ Corò-Volpe (2003)

²⁹ Corò-Volpe (2003)

³⁰ Micelli-Chiarvesio-Di Maria (2003)

contractors in central and European Eastern countries and by a concentration of strategic partners in the EU25.

The chain value is also changing: the strategic content of the chain value is still localised in the EU15, while the other parts of the value are produced where local competitiveness can ensure improvement in the firm's competitiveness. In the case of Italy, the well-known model of "conto terzi", by means of which the Third Italy (Veneto, Emilia Romagna, Marche) developed in the Seventies and in the Eighties, is being repeated. The strategy consists in the creation of "territorial long networks" where the social organisation of labour is developed along with technology. An example is the Timisoara district, where firms from Veneto are establishing their own initial organising model of production.

An increasing degree of co-operation-competition characterises these relationships and further evolution is already taking place. Additional parts of chain value will gradually be transferred to foreign partners as long as increasing efficiency emerges there.

Nevertheless, the main point concerns the impact that delocalisation has on countries of origin. There are surveys³¹ that confirm a long-run positive impact in terms of employment and income, but this is only an empirical result and it might be the case that these positive results will not necessarily continue in the future. At the same time, in the emerging country problems linked to the short-term effectiveness of these productive agreements might emerge. When discussing the case of Romania, Pislaru-Oana (2004) emphasises the risk deriving from the fact that production is beyond the control of the Romanian partners of foreign firms, and the potential re-location of the firms is always possible. In some cases, an intermediate good in the Romanian wood sector is re-imported to Romania as a final good (furniture) from EU countries.

4. Policy recommendations in the context of cluster-based policies and interregional co-operation

We started from the idea that industrial clusters are one of the alternative frameworks that can be used to set up policies. The process of identification of a proper

³¹ Schiattarella (2002)

industrial cluster, regardless of the theoretical debate that is far from conclusion, is still a major problem in advanced and emerging countries. Nevertheless, a number of cluster-based policies have been developed in Europe and only in a few cases the perspective was focused on co-operation along with competition.

The potential from co-operation has not been exploited and it can be foreseen that, as long as globalisation exists and aggressive competition increases, the debate will be limited to a vague critique of the new international division of labour.

It is self-evident that firms adapt increasingly to the requirements of the internationalisation of competition. The delocalization (or re-localisation) processes are important, but the increasing number of agreements between firms that are generating clusters by means of clusters in emerging countries are becoming far more important. Until now only relatively poor parts of production are concentrated in these countries, but as time goes by an increasing number of functions will be concentrated in new countries. This will also occur because new countries will become more and more interesting local markets. The reaction in advanced countries should include robust forms of co-operation, to forecast and follow this productive structural change.

We cannot forget, for example, that as regards intra-Europe relationships, we (the EU25 as a whole) must follow efficiency choices and production must be located where it is most profitable. The need to think as a unified territory has still to be digested by the more advanced European countries. Policy support is needed in order to organise proper governance of the change.

Moreover, there is another crucial policy topic to be faced. Productive co-operation can most certainly be usefully supported by alternative cluster-to-cluster policy that may favour integration and that might also involve different components of the cluster, such as business services, research institutions or public institutions. In this field there might be interesting developments and rich possible policies. This is a relevant topic for regions characterised by geographical proximity and localisation in different countries, and also for clusters that could communicate at the research stage or the marketing stage of the production process.

Preissl (2000) emphasises that the relationships between the actors of the cluster can be more or less strong and intense, but anyway they are open networks if the innovation activity prevails. Following Preissl, let's take as an example the automobile component-manufacturing cluster: here the innovating company has relationships with clients and suppliers, with research and technology organisations (RTOs), small task sub-contractors, business services, university academics and agents. The possible cluster-to-cluster relationships are far more complex than firm-to-firm relationships. In the following table a possible representation of these links is provided, in an attempt to depict the intensity of these relationships for two similar clusters (H=high intensity; M=medium; L=low).

Table 6 – Cluster to cluster relationships

<i>Cluster A</i>	<i>Innovating/ central company</i>	<i>Clients</i>	<i>Suppliers</i>	<i>RTOs</i>	<i>Subcontractors</i>	<i>Business services</i>	<i>University academics</i>	<i>Agents</i>
<i>Cluster B</i>								
<i>Innovating/Central company</i>	H	M	L	H	M	M	H	H
<i>Clients</i>		L	M	L	L	L	L	M
<i>Suppliers</i>			L	L	M	L	L	M
<i>RTOs</i>				H	L	M	H	M
<i>Subcontractors</i>					L	L	L	L
<i>Business services</i>						M	H	H
<i>University academics</i>							H	M
<i>Agents</i>								L

This framework might be more intricate and relationships more intense if the two clusters are characterised by stronger trade partnerships or delocalization phenomena, but even at this level there is room for promising high level relationships. In some cases, these relationships might derive from the less central members of the cluster, for example from relationships between universities or university and agents that facilitate the circulation of information. It is self-evident that there is wide room for research and further analysis in order to investigate at what level the enlargement of cluster-to-cluster relationships may emerge.

References

- Alderman N. (2004), "On the Relationship Between Clusters and Large-scale Projects", paper presented at International Workshop on "Cluster policies and local development", Master in Territorial Marketing, MUMAT, Cremona, July
- Baussola M. – Ciciotti E. - Timpano F. (eds), (2004), "Local development and economic policies", forthcoming
- Bergman E.M. – E.J. Feser (1999), "Industrial regional clusters: Concepts and Comparative Applications", The Web Book of Regional Science, Regional Research Institute, <http://www.rri.wvu.edu/WebBook/Bergman-Feser/Contents.htm>
- Boekholt P. – B. Thuriaux (1999), "Overview of cluster policies in international perspective", A report for the Dutch Ministry of Economic Affairs
- Ciciotti E. – F. Timpano (2004), "Allargamento e competitività dell'economia italiana", in AA.VV., "L'allargamento da 15 a 25 paesi rafforzerà l'Unione Europea", Osservatorio Giordano dell'Amore, forthcoming
- Corò G. e Volpe M. (2003), "Il ruolo delle piccole e medie imprese nelle integrazione internazionale della produzione", (mimeo) Dipartimento di Scienze Economiche, Università Ca' Foscari, Venezia
- den Hertog, P., Bergman, E. and Charles, D.R. (eds.) (2001) *Innovative Clusters: Drivers of National Innovation Policy*, OECD, Paris.
- den Hertog, P. and Brouwer, E. (2001) "Innovation in the Dutch construction cluster", in den Hertog, P., Bergman, E. and Charles, D.R. (eds.) *Innovative Clusters: Drivers of National Innovation Policy*, OECD, Paris, 203-227
- De Bresson C. – Hu X. (1999), "Identifying Clusters of Innovative Activity: a New approach and a Toolbox", in AA.VV., "Boosting Innovation: The Cluster Approach", OECD, Paris
- Enright M.J. (2001), "Regional clusters: What we know and what we should know", Kiel Institute International Workshop on Innovation clusters and International Competition
- Enright M.J. and Roberts B.H. (2001), "Regional Clustering in Australia", *Australian Journal of Management*, vol.26, August
- European Commission (2002) "Regional Clusters in Europe", *Observatory of European SMEs*, n.3.
- European Trend Chart on Innovation of the European Commission (2003), Enterprise Directorate General
- Gecse G. (2001), "Clusters in Transition Economies", draft, Ministry of Economics and Transport
- Hauknes J. (1999), "Norwegian Input-Output clusters and innovation patterns" in OECD (1999)
- Isaksen A. (1997), "Regional clusters and competitiveness: the Norwegian Case", *European Planning Studies*, February
- Jacobs D. – A. de Man (1996), "Clusters, Industrial Policy and Firm Strategy: A Menu Approach", *Technology Analysis & Strategic Management*, Vol. 8 (4), pp. 425-437

- Lagendjik A. – D. Charles (1999), *“Clustering as a new growth strategy for regional economies? A discussion of new forms of regional industrial policy in the United Kingdom”*, in OECD (1999)
- Malerba F. (2000), *“Economia dell’innovazione”*, Carocci, Rome 2000
- Micelli S., Chiarvesio M., Di Maria, E., *“La strategia di internazionalizzazione delle imprese distrettuali, in “Internazionalizzazione dei sistemi locali di sviluppo”*, Ricerche Formez n°7, Roma 2003
- Mitra, J. and Matlay, H. (2000) *“Thematic clustering: connecting organisational learning in small and medium-sized businesses”*, *Industry and Higher Education*, 14: 371-385.
- OECD (1999), *“Boosting Innovation: The Cluster Approach”*, Paris
- Paniccia I. (2004), *“A comment”* (2004) in Baussola-Ciciotti-Timpano (2004), forthcoming
- Pislaru D. – A. Oana (2004), *“To cluster, or not to cluster? The potential for competitive economic growth through cluster development in Romania”*, paper presented at International Workshop on *“Cluster policies and local development”*, Master in Territorial Marketing, MUMAT, Cremona, July
- Porter M (1990) , *“The competitive Advantage of Nations”*, Macmillan, London and Basingstoke
- Porter M.(1998), *“Clusters and the new economics of competition”*, in *Harvard Business Review*, November-December
- Preissl B. (2000), *“The Innovation Cluster of the German Automotive Components Sector”*, DIW-RISE Working Paper n.3, DIW Berlin
- Rosenfeld S.A. (1997), *“Bringing Business Clusters into the Mainstream of Economic Development”*, *European Planning Studies*, 5: 3-23
- Schiattarella R. (2002), *“Gli effetti della delocalizzazione internazionale nei Paesi Terzi Mediterranei. Un’analisi per il comparto del made in Italy”*, *Argomenti*, 6,
- Sforzi F. (1990), *“The quantitative importance of Marshallian industrial districts in the Italian economy”*, in Pyke F., G. Becattini and W. Sengenberger (eds.), *“Industrial districts and inter-firm co-operation in Italy”*, International Institute for Labour Studies, Geneva (75-107)
- Sforzi F.–Lorenzini F. (2001) *“I Distretti industriali”* in AA.VV. (2001) *“L’esperienza italiana dei distretti industriali”*, Report per IPI
- Timpano F. (2004), *“Cluster identification and cluster policies in EU accession and candidate countries”*, in Baussola M. – Ciciotti E. - Timpano F. (2004)
- Tomasetti (2004), *“Benchmarking of cluster policies in Europe”*, mimeo
- Whalley J. – den Hertog P. (2000) , *“Clusters, innovation and RTOs”*, final report of RISE, University of Brighton