

# WHAT MAKES A SUCCESSFUL CLUSTER?

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## **Abstract:**

*Clusters are groups of firms, related actors, and institutions that are located near one another and that draw productive advantage from their mutual proximity and connections. Cluster thinking and cluster strategies have the potential to accelerate regional economic growth and assist with the nation's needed economic restructuring, but they are more a paradigm than a single program. In that sense, the opportunities that a cluster policy framework provides for delivering impact, clarifying economic priorities, and coordinating disparate programmatic efforts will only grow more important in the coming era of intensified competitive pressures and tightened resources. Although clusters are different in many aspects, successful clusters share a number of common features.*

**Keywords:** *Clusters, innovation, factors, cluster strategies, cluster policy*

**JEL Classification:** O32; R11

## **I. INTRODUCTION**

In economics, clusters have already become a familiar concept. Cluster concepts of all kinds have been an element of growing importance in the economic research agenda. According to Porter (1998) a cluster is "*a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities.*" Clusters vary in size, depth and level of aggregation across geographic localization, industries and from cluster to cluster. *Clusters are about collaboration*, not just locating firms in the same place. *Clusters represent an important part of the European economic reality.*

Because of the shared proximity – both in terms of geography and of activities – cluster constituents enjoy the economic benefits of several types of positive location-specific *externalities* such as: access to specialized human resources and suppliers, knowledge spillovers, pressure for higher performance in head-to-head competition and learning from the close interaction with specialized customers and suppliers.

Clusters are important because they create tangible economic benefits. The benefits of a cluster come in three *dimensions*:

1. Companies can operate with a higher level of efficiency, drawing on more specialized assets and suppliers with shorter reaction times than they would be able to in isolation.
2. Companies and research institutions can achieve higher levels of innovation. Knowledge spillovers and the close interaction with customers and other companies create more new ideas and provide intense pressure to innovate while the cluster environment lowers the cost of experimenting.
3. The level of business formations tends to be higher in clusters. Start-ups are more reliable on external suppliers and partners, all of which they find in a cluster. Clusters also reduce the costs of failure, as entrepreneurs can fall back on local employment opportunities in the many other companies in the same field.

In many countries, *clusters of innovative firms are driving growth and employment*. Innovative clusters of economic activity are becoming magnets for a new technology, skilled personnel and research investment. These groups of enterprises tend to be well established and stable, innovating through strong backward and forward linkages with suppliers and customers. Co-operation in clusters has increasingly become a requirement for success. Moreover, *co-operation offers a direct way to improve economic performance and reduce costs*. Costs can be reduced if new knowledge and technology can be acquired more cheaply outside the firm than if it were to be produced in the house.

Economic clusters emerge most often where there is *a critical mass of firms allowing economies of scale and scope*, a strong science and technology base, and a culture conducive to innovation and entrepreneurship. Clusters can also be based on factors such as natural resources or geographical advantages. Many successful clusters have long historical roots, and the emergence of new clusters takes time.

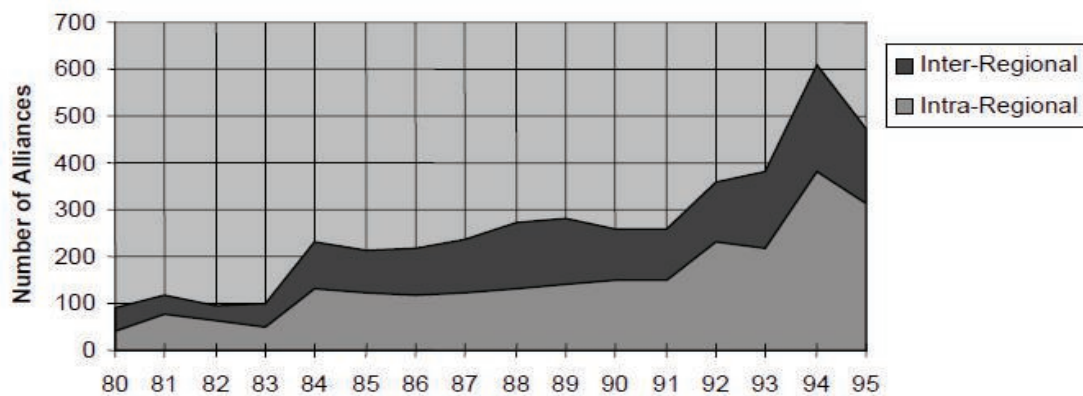
*Clusters can be interpreted as reduced-scale national innovation systems*. The dynamics, system characteristics and interdependencies of individual clusters are similar to those of national innovation systems. With its focus on knowledge linkages and interdependencies between actors in networks of production, the cluster approach offers a useful alternative to the traditional sectoral approach.

*Clusters can be identified at various levels of analysis*. Micro-level analysis focuses on inter-firm linkages, industry- (meso-) level analysis on inter- and intra-industry connections in the production chain, while macro-level analysis examines how industry groups form the broader economic structure. Cluster analysis can also be applied at the regional level.

Clusters can be characterized as *networks* of production of strongly interdependent firms (including specialized suppliers) linked to each other in a value-adding production chain. In some cases, clusters also encompass *strategic alliances* with universities, research institutes, knowledge-intensive business services, bridging institutions (brokers, consultants) and customers. The cluster perspective provides a number of advantages over the traditional sectoral approach in analyzing innovation and innovation networks.

*Firms almost never innovate in isolation*. Networks of innovation are the rule rather than the exception, and most innovative activity involves multiple actors (OECD, 2001). To successfully innovate, companies are becoming more dependent on complementary knowledge and know-how in companies and institutions other than their own (Figure 1).

Figure 1. STRATEGIC ALLIANCES, 1990-95

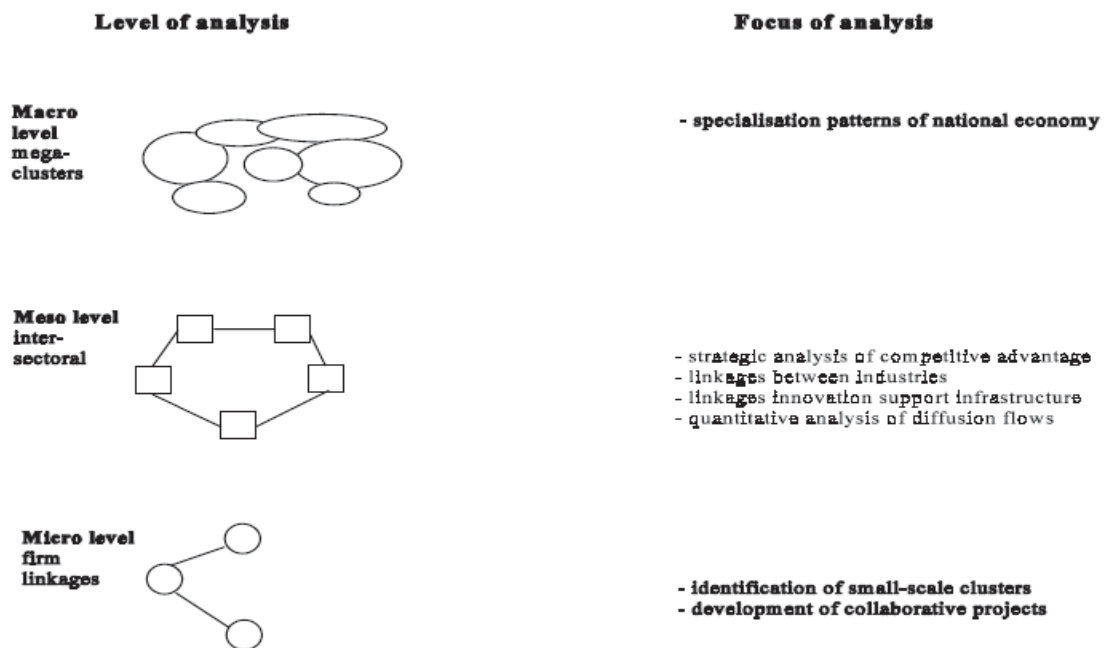


Source: European Commission, Second European Report on S&T Indicators, 1997.

Clusters can be seen as reduced-scale innovation systems. The dynamics, system characteristics and interdependencies are similar to those for national innovation systems. The cluster approach provides a number of advantages over the traditional sectoral perspective in analyzing innovation and innovation networks.

*The cluster concept focuses on the linkages and interdependencies among actors in the value chain in producing products and services and innovating.* Clusters differ from other forms of co-operation and networks in which the actors involved in a cluster are linked in a value chain. The cluster concept goes beyond “simple” horizontal networks in which firms, operating on the same end-product market and belonging to the same industry group.

Figure 2. CLUSTER APPROACHES AT DIFFERENT LEVELS OF AGGREGATION



Source: Roelandt and den Hertog, 1997.

## II. WHY FOCUS ON CLUSTERS?

*Globalization has created hard competition among regional economies.* In the healthy regions, competitiveness and economic growth is driven by strategies that are focused on promoting innovation, often in clusters of inter-related industries. In recent years hundreds of cluster initiatives have been launched in various regions of the world.

The *increased interest in cluster development* is driven by a desire on the part of regional development authorities for economic growth. There are generally three advantages for a company to locate in a cluster.

Clustering can bring a wide range of other benefits to both businesses involved and the wider economy of the region (UK DTI, 2002). These *benefits* include:

- *Increased levels of expertise.* Due to their close interactions, clusters provide companies with an opportunity for inter-firm learning and greater depth of understanding of their supply chain.
- *Ability of firms to draw together complementary skills.* Companies in a cluster can pull together complimentary resources to approach more complex projects that as individual units they would be unable to do.

- *Potential for economies of scale.* Companies in a cluster can pull together demands for various raw materials to benefit from economies of scale in purchasing such material and to attract bulk discounts.
- *Improved information flow within a cluster.* Opportunities for face-to-face interactions and other communications mechanisms within clusters improve information flow helping innovators to have access to the latest technology and market information, rapidly and efficiently.
- *Development of the infrastructure.* Technology clusters enable development of physical infrastructure, e.g. communications and transportation facilities, as well as support services such as professional, legal and financial.

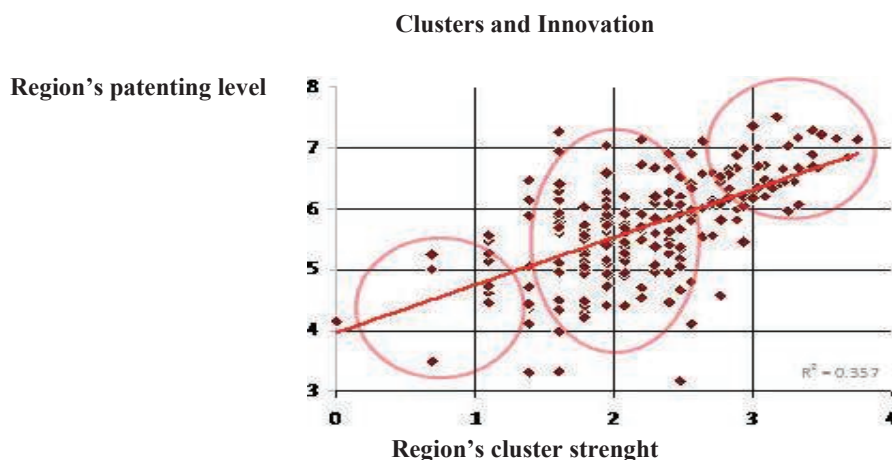
### III. CLUSTERS' INNOVATION OUTPUT

It is well understood that innovation is distinct from invention. Invention represents the creation of something new, often with a technical meaning. Inventions can be patented. Innovation is also about new things; new products, production processes, services and novel business models. But this is only the first side of the coin. The other side is about bringing the new product or service into use and commercial value. The height of an innovation is not about how big the idea is, but how widely it is coming into use.

We can distinguish between two *main sources of innovation*: the scientific community and entrepreneurs or entrepreneurial firms.

The innovation must be put into use, and in the end there must be customers prepared to pay for it and also prepared to switch from the current technology or concept. Clusters offer complementary skills, sophisticated users, access to education and research, and financial capital prepared to finance new ventures. Clusters offer the soil where ideas are turned into successful commercial service and products; clusters offer a soil for innovation.

**Figure 3. THE RELATIONSHIP BETWEEN A REGION'S CLUSTER STRENGTH AND ITS PATENTING LEVEL**

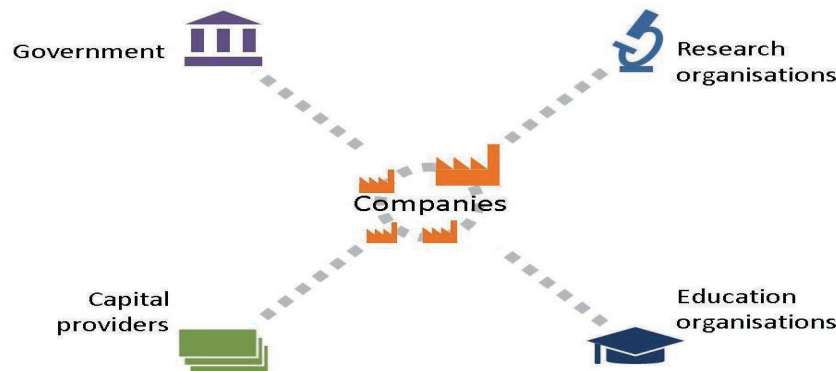


**Source:** Europe Innova / PRO INNO Europe paper N° 5 INNOVATION CLUSTERS IN EUROPE  
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Innovation is not equally distributed across space within a relatively homogenous region such as Europe. If we measure innovation inside nations we would find similar patterns; innovation is unevenly distributed within nations. City regions

vary in their capacity to innovate, but more importantly they breed innovations in different sectors.

Figure 4. FIVE TYPES OF ACTORS IN A CLUSTER



Source: Europe Innova / PRO INNO Europe paper N° 5 INNOVATION CLUSTERS IN EUROPE  
[www.proinno-europe.eu/sites/default/files/page/10/05/PRO%20INNO%20Europe](http://www.proinno-europe.eu/sites/default/files/page/10/05/PRO%20INNO%20Europe)

The reason clusters are relevant for innovation is that when there is a *critical mass* in a location of a sector or industry, the different agents can support each other. Through interaction within the cluster, they can provide conditions that are highly adapted to the necessities of the firms.

The development of various kinds of clusters has been a priority for governments around the world for many years now. The appeal for governments of trying to create innovation-led clusters is clear, but getting it right is hard. *Cluster development is a long-term effort, usually measured in decades.*

There is general agreement among researchers that technology *clusters have higher innovation output*. Much of the recent studies have been focused on identifying what contributes to this higher rate of innovation. Many researchers have attributed the increased innovation output of clusters to knowledge spillovers within the clusters. Some studies have used patent counts as a measure of the innovation output illustrating that companies within clusters generally produce more patents from their R&D investments than those outside the clusters.

#### IV. FACTORS INFLUENCING INNOVATION IN CLUSTERS

While the clustering of firms can lead to increased innovation, little is known as to the specific factors that drive the increased innovation output of clusters.

This is an area of our current research. In a recent survey of inventors in the telecom industry, we found the following *factors* to have significant influence on the inventors in clusters for coming up with their inventions as compared to those not in clusters (Ibrahim and Fallah, 2005):

1. Interacting with subject matter experts in the local area.
2. Personal relationships developed with other researchers in the local area.
3. Having interactions with customers, suppliers, competitors who are present in the local area.
4. Brainstorming sessions with people in the local area.
5. Informal meeting with people in the local area.

These factors prove the importance of access to tacit knowledge for innovation which can be gained in face-to-face interactions and the fact that opportunities for such interactions are much more for those in a technological cluster than those in isolated areas. The working environment of the clusters was rated as having the greatest



influence on innovation, which points to some of the intangible attributes and motivators of creativity that exist by simply being in a vibrant and active geographical area.

Corporate executives and managers can promote creativity and innovation in their organizations by focusing on the practices that mostly influence the inventors.

**Factors** that did not seem to matter whether or not the inventors were in clusters include:

1. Accessing publications or papers from local authors.
2. Attending presentations or lectures in the local area.
3. Formal meetings with people in the local area.
4. Conferences, seminars and/or workshops in the local area.
5. Social gatherings in the local area.

These factors indicate that people can access explicit knowledge such as publications virtually from anywhere. One does not have to be in a cluster to access publications, or attend seminars or conferences.

Clusters are not the latest or most avant-garde economic development concept. The fact is that clusters have emerged now as a major paradigm for national, state, and metropolitan economic steering for three main **reasons**:

- New research has provided added evidence that clusters on the ground promise solid *economic benefits* at a time of economic uncertainty
- At the paradigmatic level, clusters *reflect the nature of the real economy*, which means that thinking about them and leveraging them can help the nation get clearer about the true sources of growth after years of diversion
- Clusters and cluster thinking offer *a compelling framework within which to rethink, reorganize, and reform* federal, state, and regional economic development efforts

Clusters provide a timely framework for rethinking and refocusing economic policy after a period of drift. In this way, the cluster paradigm yields practical insights that can help policymakers at the federal, state, or level rethink their priorities right and maximize the impacts of their efforts at a time of constrained resources.

Cluster share **four critical characteristics**:

- *Proximity*; they need to be sufficiently close in space to the sharing of common resources,
- *Linkages*; their activities need to share a common goal,
- *Interactions*; being close and working on related issues is not enough – for positive cluster effects to occur some level of active interaction has to be present
- *Critical mass*; finally, there needs to be a sufficient number of participants present for the interactions to have a meaningful impact on companies' performance.

*Cluster mapping* is a potentially powerful tool that could help identify, on a statistical basis, the existing, growing, declining and emerging industry clusters in a given geographical area. Therefore it offers the possibility to build cluster policies based on the industrial strengths and weaknesses in a region. On the other hand, the analysis needs to be further improved, by considering further statistical indicators and qualitative information.

Several methodologies exist for the statistical mapping of clusters. *Each method has its advantages and limitations*. Statistical cluster mapping is an important tool for identifying clusters, but it is not sufficient. *Qualitative information* from the ground is also necessary to validate the statistical findings and provide complement information that cannot be captured from the statistical data, such as the framework policy

conditions. In the framework of the European Cluster Observatory, a number of *cluster case studies* will be made available providing qualitative information about the success factors for cluster growth.

## V. WHAT MAKES A SUCCESSFUL CLUSTER?

Although clusters are different in many aspects, successful clusters share a number of common features. According to a recent study by the UK Department of Trade and Industry (UK DTI, 2002), these common features are divided into three groups as follows:

### 1. *Critical Success Factors:*

- *Presence of functioning networks and partnerships.* Strong professional, social and informal networks are fundamental to the effectiveness of a cluster. Such networks may naturally develop within a cluster or be facilitated and promoted by intermediaries such as local associations, technology clubs or governmental agencies.
- *A strong innovation base, with supporting R&D activities.* Universities and research institutions are often the hubs for new ideas and basic research in the growing clusters. For example, Stanford continues to be a critical innovation base for Silicon Valley.
- *Existence of a strong skills base.* A highly skilled and mobile workforce ensures the flow of information and development of new ideas.

### 2. *Contributing Success Factors:*

- *An adequate physical infrastructure.* Physical infrastructure plays a significant role in attracting companies to a cluster as well as facilitating interactions among the companies.
- *Presence of large firms.* Large firms act as anchors creating a viable economic base for the cluster to evolve.
- *A strong entrepreneurial culture.* Clusters grow with the creation of new businesses. A culture of entrepreneurship and risk taking encourages start ups and investment in R&D.
- *Access to sources of finance.* New technology start ups often can not survive without external sources of funding. Government policies often play a significant role in facilitating and providing financial support to new start ups in such clusters.
- Other factors such as *presence of support services* and *general economic conditions* could also affect the functioning of a cluster

## CONCLUSIONS

Clusters are simply a geographically proximate group of *interconnected companies and associated institutions in a particular field*, linked by various commonalities and complementarities.

Clusters are groups of firms, related actors, and institutions that are located near one another and that draw *productive advantage from their mutual proximity and connections*. Clusters arise and grow because the firms within them profit materially from the presence of powerful “*externalities*” and “*spillovers*” that bring them important competitive advantages, ranging from the presence of a specialized workforce to supplier specialization and the exchange of leading edge knowledge.

Clusters are not static and the new successful clusters may emerge over time whereas previous industrial strongholds may lose their attractiveness. These *cluster*

*dynamics need to be better understood when defining regional development strategies or industrial policies aiming at the facilitation of structural changes.*

*The relation between clusters and innovation is clearly complex.* A comparison between the regions having the most stars with the best performing innovation regions in Europe shows that 7 out of 19 regions having a strong cluster portfolio are among the top third most innovative regions.

Clusters are in the “*missing middle*” of conventional economics, between the general economy and the individual firm. They grow in the often ignored space of places, local institutions, labor markets, and groups of firms rather than single firms.

*Thanks to clusters, firms, regions, and the nation are more productive than they might otherwise be.* As a result of clusters, millions of workers, firms, and regions are enjoying higher wages, more competitive industries, more innovation, and more successful entrepreneurship than they might otherwise.

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