

Simone Strauf, Roland Scherer
Institute for Public Services and Tourism IDT-HSG
Dufourstr. 40a
CH – 9000 St. Gallen
Tel.: +41 71 224 2525
simone.strauf@unisg.ch
roland.scherer@unisg.ch

CLUSTER AND CLUSTERSTRATEGY IN SWITZERLAND

Abstract

High expectations are attached to clusters and cluster initiatives. New skilled jobs, better regional development and promotion of the capacity for innovation are often at the forefront of considerations. There are currently a multitude of analyses and studies on this topic. But the concrete success of cluster strategies can hardly be proven beyond doubt. The analyses frequently are based on different understandings of what clusters are, and different methods of identifying clusters yield different results. Only in the long term will it be possible to show whether and to what extent clusters can contribute to successful development. Important requirements include the evaluation of strategies used to date as well as targeted cooperation among science, politics and management.

Introduction

The discussion on clusters has gained in popularity in recent years. Clusters hold an unwavering attraction for scientists and researchers as well as regional politicians, consultants or promoters of the economy. Currently there are numerous studies, analyses and publications on this topic that focus on the existence, effects and strategies of promoting clusters. But the concept of clusters is not new; it was already being discussed at the beginning of the 20th century when the spatial proximity of corporations and their effect on increasing productivity were being studied. Since then approaches to clusters are viewed in the context of the capability for innovation and learning, of not only corporations but also regions. The promotion of connections and clusters is often propagated as one of the central instruments for promoting regional or specific locations. In Switzerland, a series of works on clusters and similar concepts has been generated in recent years. The significance of clusters for regional development has been emphasised at the federal and cantonal levels and in part at the regional level and has been promoted as part of cluster strategies and initiatives. However, it is evident in practice that very different terms and characteristics are often associated with a cluster and that it can be difficult to identify clusters and prove their effects. This contribution provides a theoretical taxonomy of approaches to clusters from the perspective of regional science (the keyword being “competition of the regions”). In addition, two examples of quantitative methods for identifying clusters are presented. The “Location: Switzerland” programme is introduced as an initiative at the federal level for promoting clusters. The results are then summarised and evaluated, and a framework for areas of future research is presented.

Definitions of Clusters and Opportunities for Identifying Clusters

There is a long tradition in discussing the promotion of competitiveness for

corporations and regions by (spatial) concentration and networking. Even if the term “cluster” or “cluster theory” first appears intensely in the discussion in recent years, the associated concepts and approaches were already significant in the first half of the 20th century (e.g. Marshall 1920). Since then an almost overwhelming number of works on the topic of “clusters” have appeared, and the background definitions are just as numerous (“Cluster theory is in a state of confusion; ...the confusion of definitions”, Martin, Sunley 2001).

The different approaches to clusters can be categorised according to a spatial logic and a cognitive logic (see Figure 1). If clusters are viewed through a spatial logic, the issue of the significance of spatial proximity as a prerequisite for the existence of an innovation system is at the forefront. (“A proximity that is only geographic in nature can provide the basis for the presence of an agglomeration of firms, but is not necessary for the presence of a system of innovation” (Fischer 2001). The significance of spatial proximity is mentioned explicitly by Porter in the cluster concept as well as in the milieu theory. According to that theory, an innovative milieu can form only if geographic proximity and multiple relationships exist between the players. Camagni (1991, p. 130) defines innovative milieus as “a set of territorial relationship in a coherent way a production system, different economic and social actors, a specific and representation system, and generating a dynamic collective learning process”. Koschatzky (2003:14f) notes in this context that the type of knowledge is responsible for whether spatial proximity is a central prerequisite: “Codified and standardised knowledge can be transferred over far distances at low cost, making the spatial proximity between the provider and recipient of knowledge unnecessary. In contrast, the exchange of implicit, non-codified knowledge or even of sensitive and strategic knowledge among individuals requires personal contacts as well as verbal and non-verbal communication and reacts sensitively to an increasing distance between the partners participating in an exchange of knowledge.” Thus, clusters and milieus, which rely heavily on the comprehensive exchange of knowledge, always require a regional dimension.

In addition to the definitions listed for clusters there are many other approaches. The following figure shows a systematic overview on categorising the various definitions into each type of logic:

Figure 1. The Roles of Clusters – a Theoretical Taxonomy

Spatial logic →	Territorial approach	Network approach
Cognitive logic ↓		
Functional approach	Cluster Diversification and specialisation of activities Concentration of externalities Density of proximity contacts Reduction of transaction costs	Interconnection Cluster as a node in multiple interacting technological, communication and economic networks Cluster as interconnection between place and node
Symbolic approach	Milieu Substrate of collective learning Uncertainty-reducing operator through: information transcoding ex-ante co-ordination of private decisions (collective action)	Symbol Cluster as a 'landmark' for an innovative region Cluster as a status symbol for local or regional promotion agencies and politicians Cluster as a producer for symbols and codes of 'change towards a brighter future' and as a 'change agent'

Normative approach	Learning Region	International Competitiveness
	Promoting of regional innovation and production systems (RIPS) Support of higher educational system (HES) to foster human capital Information and mobilising platform for local and regional actors of small size clusters	Ranking of international technological Centres of Excellence Support of incubator centres, start-up or spin-off firms International promotion platform of location and cluster competencies

Source: Duemmler, Thierstein 2003, p. 5

Although the definition of clusters in theory and in practice still remains vague and provides for a wide range of interpretations—which is also a criticism of the Porter definition—despite the multitude of publications, studies and analyses, the following dimensions can be identified as decisively influencing the existence of a cluster (cf. Duemmler 2004):

1. Distance: Spatial proximity and concentration of corporations, institutions and facilities
2. Links: Connecting the players through value added chains, networking and cooperation
3. Externalities: Generating and gaining knowledge, know-how from the relationship to the participating players

Even if the three signals listed above are necessary for a cluster to exist, each manifestation of a cluster can be significantly different. It is often difficult to define clusters empirically as they cannot be oriented based on industry or administrative boundaries and include corporations as well as other organisations and institutions. Furthermore, the close relationship among terms like “networking”, “network”, “cooperation” or “innovation system”, which partially may be used synonymously with the term “cluster”, does not clarify the definition and hinders the identification of clusters. For example, the EC performed the following differentiation in 2002 to increase clarity and provide clear definitions:

Figure 2 A Hierarchy of Three Concepts

Concepts	Definitions and differences
Regional Cluster	A concentration of 'interdependent' firms within the same or adjacent industrial sectors in a small geographical area
Regional innovation network	More organised co-operation (agreement) between firms, stimulated by trust, norms and conventions, which encourages firms' innovation activity
Regional innovation system	Co-operation also between firms and different organisations for knowledge development and diffusion

Source: EC 2002, p. 14

Depending on the definition and terminology, different methods are applied to determine and identify clusters. The following briefly explores the most important methods for analysing and identifying clusters (cf. Roelandt, den Hertog 1998, p. 18-19):

- **Case studies:** Case studies are based on qualitative information supplemented case by case by statistical data.
- **Localisation coefficient:** The localisation coefficient maps the share of an industry's

employees in a sub-region proportional to the share of that industry's employees in the region as a whole. Thus, it is a measure of the concentration of an industry in a region. The problem with localisation coefficients is that the threshold values that are used to discuss clusters are more or less chosen arbitrarily (Martin, Sunley 2001, p. 31). It is also not clear for employee data whether a high coefficient (signifying the concentration of an industry) originates from one large corporation or several small companies. As localisation coefficients do not contain any data on integration, other methods are necessary to determine clusters (Bergmann, Feser 1999, Ch. 3).

- **Input/Output Analyses:** Input/output analyses are based on trade relationships between industries or corporations within an industry. The data for this method is usually very limited.
- **Network analyses:** This method of analysis is used to identify sets and patterns in the network of corporations and industries using integration relationships (including input/output analyses).

In practice the analysis methods listed often are difficult to apply. Sufficient statistical data in many cases is not available, particularly if industrial and administrative boundaries overlap. Furthermore, the interpretation of the data is plagued with difficulties. Even the level of examination can impede the identification of clusters. If examination is done at the very small, regional level, the number of clusters and their degree of specialisation increases. If an overly large spatial unit is chosen, smaller clusters may disappear from consideration.

Due to the problems listed for quantitatively establishing clusters, a qualitative procedure is often chosen. The related weaknesses are the normal weaknesses of qualitative procedures: The results, especially those based on case studies, are usually not representative and are hardly suitable for comparisons or generalisations. A combination of quantitative and qualitative methods seems to have the greatest chance of success.

Two examples of approaches to quantitative analyses in identifying clusters are introduced in the following section.

Examples of Identified Clusters in Switzerland

The applied methods for identifying and analysing clusters differ based on the definition of cluster that is used. Thus, empirical proof that a cluster exists is based on varying methods, and the clusters that are identified may show significant differences in their characteristics. Two examples of identified clusters in Switzerland that were analysed using different methods are introduced in this section. Both the input/output analysis and the localisation quotients utilise quantitative approaches for identifying clusters.

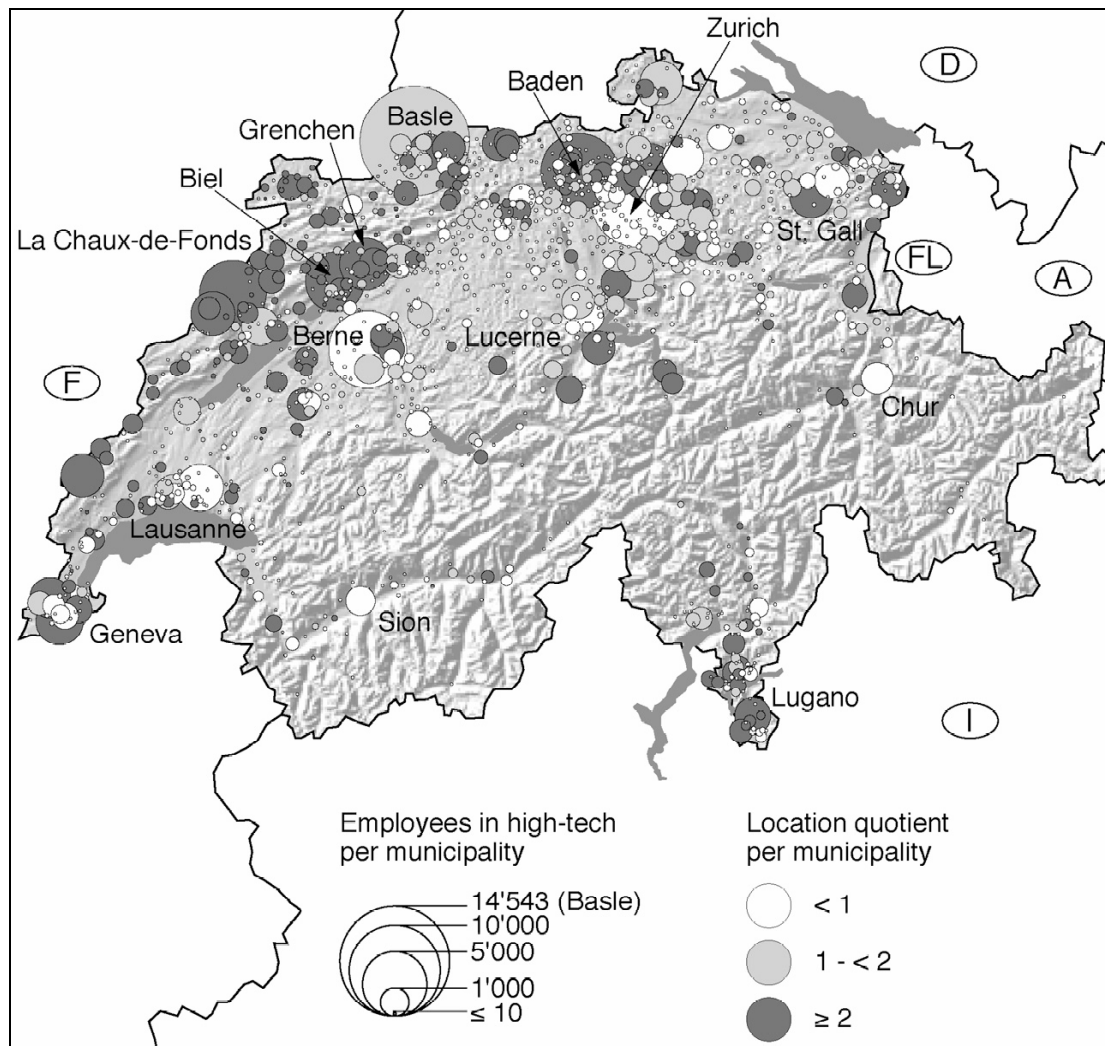
Identifying Clusters Using a Localisation Quotient

At the Swiss Federal Institute of Technology (ETH) in Zurich, a series of works were published in recent years on the regional capacity for innovation, the identification of clusters and their effect on regional development. In these publications, the European metropolitan region (EMR) of Zurich formed a main focus in the studies (such as in Thierstein, Kruse, Duemmler 2003; Duemmler, Thierstein 2003b). The concept of a metropolitan region focuses on functionality. In these studies, the EMR Zurich was to be defined with regard to its functions as a gateway and in innovation (high-quality services and high-tech) and regulation. To determine the cluster potential for one of the functions, a localisation quotient was calculated for each function. The quotient facilitates an expression of whether each function in the area being studied is over-represented (>1), balanced ($=1$) or under-represented (<1) based on number of employees in comparison to all of Switzerland. A localisation quotient of

1.5, for example, means that a region's share of employees in the high-tech industry, for example, is 1.5 times higher in that region than in Switzerland on average. The data of the national workplace counts of 1995, 1998 and 2001 were used for the calculations.

The result is the following picture (Figure 3) of high-tech employees for the European metropolitan region of Zurich.

Figure 3 High-Tech Employment 2001 (Cluster Potential by Location Quotient)



Source: Duemmler, Thierstein 2003, p. 7

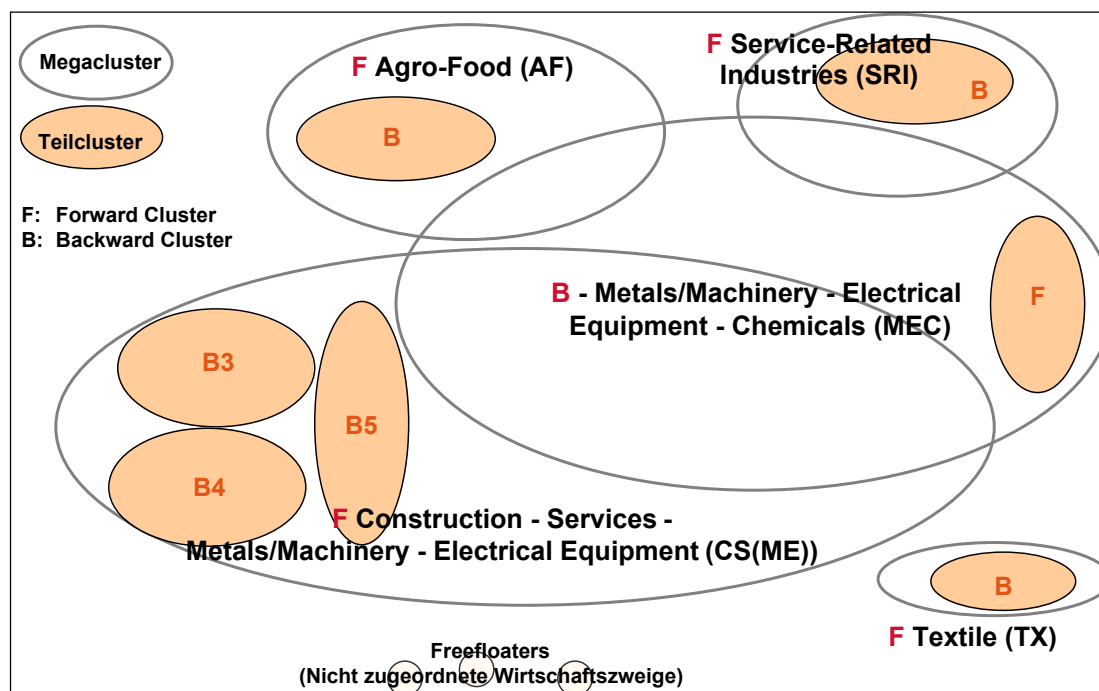
On this basis, three potential clusters can be identified: Zurich, Basel and Berne-Jura. The highest localisation quotient, 5.17, was measured in the city of Baden (Duemmler, Thierstein 2003a p. 8).

One weakness of this approach, as the authors themselves determined, is that similar economic activities (horizontal clusters) are included, but supplier and user relationships (vertical clusters) are not. It is also not clearly evident which industries were summarised into clusters and which relationships exist among the operations and industries indicated as clusters. Consequently, the term "cluster" appears to be primarily a label that is attached to a description of the geographic distribution of industries (Barjak 2004, p. 15).

Identifying Clusters Using Input/Output Analysis

Another quantitative Method often used to identify clusters is input/output analysis. In this type of analysis “supplier-user linkages” (relationships between users and suppliers) are the focus of consideration. These linkages present important parts of the value-added chains. The identification of clusters utilises the Method of Maxima which classifies linkages based on their quantitative significance and derives the formation of clusters from them. A difference is made between two phases: “forward linkages”, which are advanced relationships from the perspective of the provider, and “backward linkages”, which are relationships with forward suppliers from the perspective of the users. Threshold values are set for both phases that are decisive for defining clusters. According to Berwert, Vock (2003, p. 43) it is important for there to be a close connection between users and suppliers. For example, a cluster exists if (1) at least 20% of a supplier’s entire input-related production is delivered to a certain user and if, at the same time, (2) at least 5% of a user’s entire input is delivered by the same supplier. For Switzerland, five clusters were identified using this method (see Figure 4).

Figure 4 The five clusters of Switzerland’s national economy



Source: (Peeters, Tiri, Berwert 2001)

The clusters identified indicate some large areas of overlap (without any definite geographic arrangement) and a relatively large heterogeneity with regard to economic significance, intensity of integration, labour productivity and other indicators relevant for innovation. It must also be taken into account that this is a purely quantitative analysis based on data that could be compiled using this method. Connections to the scientific system, networking activities or informal relationships are not covered in this analysis, just as they were not covered by the analysis that uses the localisation quotient.

Identifying clusters using different methods is part of (scientific) cluster research. But implementing the results usually occurs at the political level by applying cluster initiatives or cluster strategies in order to initiate and promote clusters.

Cluster Strategies in Switzerland

Promoting clusters is often viewed by economic policies and promotion for locations as an important instrument for regional development. At the national and cantonal levels and partially at the regional level, strategies are developed for promoting clusters. In Switzerland alone, there were 70 separate industry and cluster initiatives in 2003. However, in most cases the content of individual initiatives is not interlinked, the affected spatial areas overlap, and the efficiency of each separate initiative is very difficult to prove. In the following section, the cluster strategy of the Swiss federal government is presented as an example of state promotion of clusters.

Industry Clusters in the Location Promotion of seco¹

Seco also uses the concept of industry clusters. It understands an industry cluster to be “a geographic concentration of interconnected companies and institutions in a certain branch of the economy” (Hafen 2003 p. 78). Industry clusters, from a broad perspective, consist of intense integration among companies themselves as well as with institutions of knowledge within specific areas of technology or industries. Competitive industrial clusters are accompanied by expanded competency networks, skilled labour markets and functional capital markets. On a small scale, industrial clusters influence competition by increasing the productivity of the companies based in a region. They determine the direction and pace of innovations (Hafen 2003 p. 78-79).

In defining clusters, it proved to be problematic to apply scientific definitions to the search for practical guidance for action. As a result, clusters were not defined separately; instead, the clusters defined at the cantonal level were used. The following framework conditions resulted for the federal promotion of locations (Hafen 2003 p. 82):

- “Location: Switzerland” assesses specific current and future strengths of Swiss industrial clusters and creates possible synergy benefits on the target markets for companies interested in re-locating.
- Switzerland on principle does not have an industrial policy. Promotion therefore occurs at locations where the conditions are already favourable, and an industry cluster strategy aligns itself to the existing circumstances and especially to the industry clusters promoted by the cantons.
- Cluster strategy essentially is about new technologies whose promotion leads to the development of industry clusters and who keep the cluster distribution in different industries in flux.

In contrast to industrial policy, the cluster strategy according to Hafen does not target the promotion of separate aspects of a cluster, but instead targets the interconnectedness of interlinked companies and institutions.

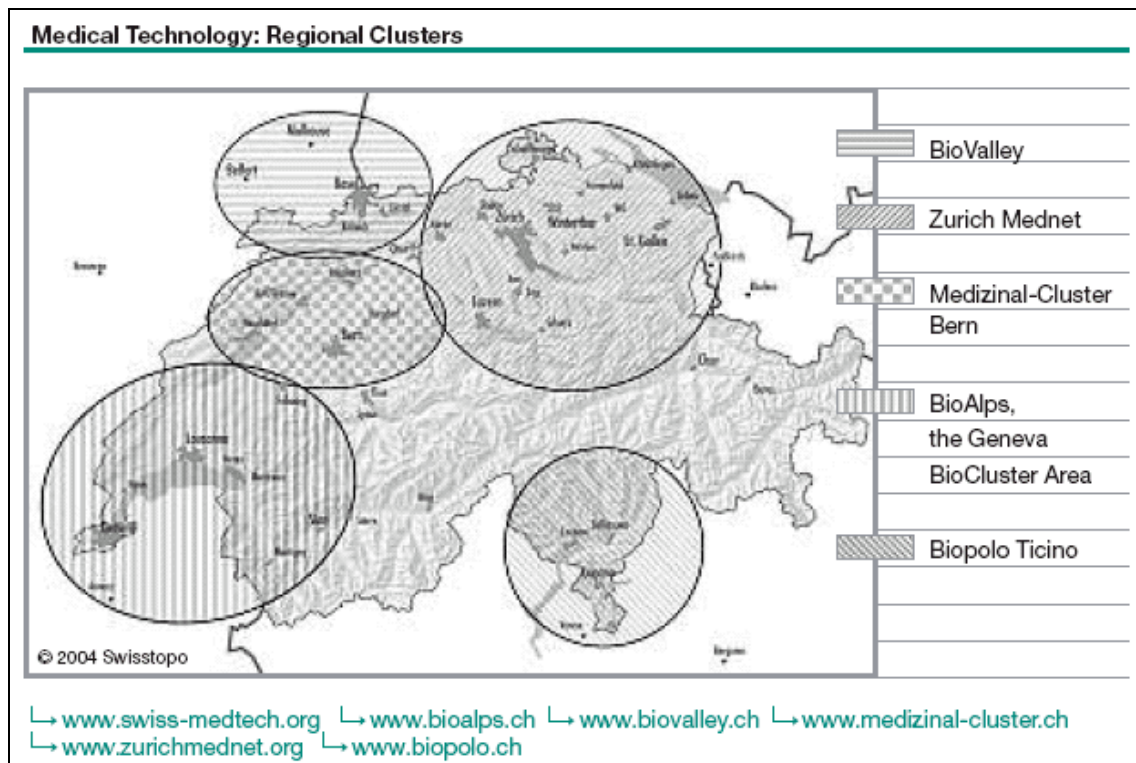
On this basis, seco identified six industry clusters in Switzerland as the focus of the “Location: Switzerland” strategy:

- Biotechnology
- Medical technology
- Microtechnology and nanotechnology
- Information and communication technology (ICT)
- Environmental technology
- Shared services, headquarters function

¹ The “Location: Switzerland” programme is implemented by the State Secretariat for Economic Affairs of Switzerland (seco) and is the federal programme for promoting Switzerland as a commercial location.

Within an industry such as medical technology, there are five main regional focuses that can be recognised.

Figure 5. Regional Clusters in medical technology



Source: www.standortschweiz.ch

From the perspective of *seco*, identifying the clusters listed above was an important step in the direction of a successful cluster strategy in Switzerland. To be successful, however, there must be more intense collaboration than until now with science and technology promotion at all federal levels and with the economic promoters within and between the cantons.

An industry cluster strategy must go far beyond traditional economic promotion and no longer focus on creating jobs but instead on creating competency networks. Not only location factors but also competency networks must be promoted in the future in order to be successful in the long term (Hafen 2003 p. 85).

Comparison of Selected Swiss Cluster Initiatives

In addition to the federal strategy for the promotion of clusters, there are a number of other initiatives at the cantonal level and in part at the regional level. When the industries that are promoted by the separate initiatives are considered, it becomes apparent that there is a rather broad overlap of industries and technologies (see Figure 6). Furthermore, there is a concentration of high-level technology industries in the initiatives listed as examples.

Figure 6. Clusters in selected political initiatives

Industry	seco	Berne	GZA (Greater Zurich Area)	Solothurn
Biotechnology, pharmaceuticals	X	X	X	X
Medical technology	X	X	X	X
Microtechnology and nanotechnology	X	X	X	X
Information and communication technology	X	X	X	
Precision industry (such as optics, sensors, photonics)		X	X	X
Environmental technology	X	X		
Energy		X		
New materials			X	
New media			X	
Business consulting		X		
Vocational training				X
Logistics and distribution				X
Design		X		

Source: Barjak 2004 p. 28

Exactly this kind of concentration on high-tech industries represents a risk of many cluster strategies. An initiative that concentrates on these industries can easily be suspected of putting “new wine in old bottles”; that is, the initiative is not really innovative and instead continues to use the same strategy used for years to promote technology without integrating new aspects. Furthermore, the concentration on high-tech industries neglects other industries that definitely have the potential for clusters and exhibit favourable conditions but are not “modern” based on political specifications. The development of cluster strategies often is also linked to the hope of promoting the initiation of clusters in a region by having companies relocate to the region. However, if a region does not have a critical mass of established companies available, no new clusters will develop there even with the assistance of cluster strategies (“To justify cluster development efforts, some needs of cluster should have already passed a market test”. Porter, 1998, p. 247).

Great hopes are often connected to the development and introduction of cluster strategies. Economic stimuli must be applied in regions that are (mostly) weak structurally; people hope for more qualitatively high-value jobs, and the competitiveness of the regions must be strengthened. Until now, however, there have been only a few empirical studies on the effectiveness of cluster strategies. Although many initiatives fail to identify clusters due to the lack of statistical data, the effects of a cluster strategy hardly can be separated from the general development of a region. Thus, positive or even negative effects of clusters or cluster strategies can hardly be proven at this time. Cluster studies more often confirm the desired or expected effects and are therefore partly redundant.

Conclusion

In Switzerland as well as in almost all other European countries, the existence and promotion of clusters are gaining particular significance. The initiation of cluster strategies is often attached to the hope of creating or maintaining skilled jobs and of increasing the capability of regions for innovation and learning in order to achieve a better competitiveness of regions, in particular, structurally weak regions. In theory and in practice, there currently are a large number of cluster definitions and methods for identifying clusters, although a significant emphasis is placed on quantitative methods of analysis. The high standing of clusters also is apparent in the constantly increasing number of cluster initiatives and strategies, and not just in Switzerland. But these strategies are not based on common definitions and analysis methods or coordinated objectives on the regional or cantonal level. Identifying clusters often fails due to the lack of data available across administrative areas. The causal effects of separate initiatives often cannot be proven. It also has not been possible to determine beyond doubt that the existence and promotion of clusters leads to a significant improvement in regional development. From the perspective of cluster research, these deficits lead to a series of questions with regard to the effects and effectiveness of clusters:

- How can the effect of clusters be measured? How can “cluster effects” be isolated?
- When are clusters successful? What requirements must be met?
- What role does the spatial proximity of companies and institutions play in a cluster?
- Can clusters be initiated, or are there minimum requirements for developing clusters?
- What advantages and disadvantages do clusters have for the companies, organisations and institutions involved?

The evaluation of current cluster initiatives and strategies can provide important clues to answering the questions listed above. In this evaluation it is important to examine each action with regard to coherence and suitability of goals and their achievement as well as with regard to their effectiveness and efficiency. The analysis of the experiences to date at the regional and cantonal level is of particular significance for future initiatives. The cooperation among science, policy, and management plays a decisive role.

It has yet to be seen whether and to what extent clusters can contribute to regional development. Short-term successes certainly are not expected; the creation of areas capable of innovation and learning is a long-term process. Clusters possibly may be one “tile” in a mosaic; but cluster initiatives alone are no panacea.

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