

# **The European Metropolitan Region of Zurich - A cluster of economic clusters?**

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## Abstract

# The European Metropolitan Region of Zurich - A cluster of economic clusters?

Switzerland is a small country and possesses only two or three major economic regions of a metropolitan character. From a Swiss perspective the most important region is the European Metropolitan Region of Zurich (EMRZ). The EMRZ covers the whole of the Zurich economic area as well as adjacent areas like Zug, Lucerne and Basle. In empirical terms the EMRZ shows an above average percentage share of manufacturing industries and advanced service companies. Although the EMRZ is recognised as the prime Swiss economic engine there is only vague perception about the locational situation of its more important industries such as pharmaceuticals, machinery, financial services and others. A true-type cluster analysis for the EMRZ is still lacking. This deficit of fundamental knowledge about the region seems all the more important since several economic promotion agencies market the greater Zurich economic area as a region with clusters in financial service industries and medical equipment.

The paper thus presents in a first step the EMRZ delimitation using some selected statistical data that are put into relation with the whole of Switzerland. The emphasis of this analysis lies on the identification of the major manufacturing and service industries that are located within the EMRZ. Followed by a short overview of the different cluster theories and a working definition for an empirical cluster analysis. The next section produces a cluster analysis based on data from the Swiss Federal Office of Statistics. This results in the identification of major clusters, location coefficients as well as a first glimpse at the interrelations between selected clusters. The paper finishes off with a hypothesis whether the spatial proximity of economic clusters in the case of the EMRZ bears any causality with its economic development.

**Key words:** European Metropolitan Region of Zurich (EMRZ), Functional Urban Region, meta-functions, cluster analysis

# 1 Introduction

Switzerland is relatively small and has only two or three larger economically relevant regions with a metropolitan character. The largest area in economic terms is the region around Zurich, which unites a multiplicity of economic activities (DÜMMLER, KRUSE 2001; DÜMMLER, THIERSTEIN 2001). This paper tries to identify economic clusters within the Zurich economic area.

But how can one geographically define the economic area of Zurich? With the application of the European Metropolitan Region (EMR) concept we try to make this delimitation. The question is first answered theoretically in section two, in order to give then in section three an application orientated answer. In particular it will be examined how distinctive the so-called meta-functions in the economic area of Zurich are in comparison to the entire Switzerland.

Section four gives a short summary of different cluster theories, emphasising the need for an empirically integral approach of the rather fuzzy theoretical concept. Section five then empirically analyses the clusters of the machine manufacturing, the chemical and pharmaceutical as well as the financial services industry in Switzerland. Section six gives a summary of the findings and the hypothesis is set up whether the spatial proximity of different clusters is linked to the economic development.

## 2 Theory of the European Metropolitan Region

### 2.1 The concept of the European Metropolitan Region

The European Metropolitan Region (EMR) was introduced as a spatial planning concept in 1995 by the German Ministerial Conference on Regional Planning. The scientific discussion of the term began with the contributions of RITTER and BLOTEVOGEL, who analysed the EMR Rhine-Ruhr (RITTER 1997; BLOTEVOGEL 1998). EMRs can be mono- or polycentric, but crucial is the functional aspect (BLOTEVOGEL 1998: 25). Depending on the examined function the delimitation of the EMR varies. The GROUP FOR EUROPEAN METROPOLITAN AREAS COMPARATIVE ANALYSIS (GEMACA) uses commuter traffic as a functional demarcation criteria for the EMR (GEMACA

1996). However this can only be seen as a rough approximation to the geographical delimitation of an EMR. If additional functions are included then the delimitation of the EMRZ has to be re-worked again.

In the last few decades many western European cities and agglomerations experienced a loss of Fordist production structures at a rapid pace, which were partly replaced by innovative services with a high added value. Typical for this far-reaching structural change is the spread of consulting and software engineering companies and the decline of the machine manufacturing industry in urban centres. One consequence of this process is that some cities are getting more and more specialised and become nodal points within international capital flows, world-wide transportation networks and commercial systems or take over central regulation and control functions. Thus, along with these changes, often comes a high degree of international or global exposure.

Three central functions of an EMR can be deduced from this development (BONNEVILLE 1994; BEHRENDT, KRUSE 2001; DÜMMLER, THIERSTEIN 2002): the innovation-, gateway- and regulation-function.

- The *innovation-function* can be divided into two parts: high-services and high-tech. This division is used in order to take into account that also an enterprise of the service industry can generate innovations. The term high-services stands for high-quality, knowledge-intensive services, which rely on a qualified and often international workforce. High-tech however stresses rather the technical side with innovative manufacturing companies.
- The *gateway-function* signifies the function of Metropolitan Regions as nodal points of national and international transportation networks and distribution centres.
- The *regulation-function* however puts into perspective the aspect of the politico-institutional and economic control.

The objective of this analysis is to show empirically that these three functions are concentrated within the same EMR, in order to prove the concept of EMR valid for the examined region.

## **2.2 The hierarchy level of the European Metropolitan Region**

The analysis of clusters can be done on different spatial hierarchy levels. Here the EMR was selected as a suitable level. The reason therefore is the close relationship of the EMR concept with location and business promotion policies: some member countries of the EU like Germany already use the EMR concept for their regional economic development strategies.

If the individual economic promotion agencies of Switzerland also have the goal to further attract international companies then small-scale thinking has to be traded for a larger scale perception. Because too often decision-makers of international companies only acknowledge Zurich, Geneva and probably also Basle as Swiss cities, smaller cities and regions are almost unknown on this international level. To keep pace with the EU the introduction of a European Metropolitan Region of Zurich (EMRZ) - as suggested here - may prove to be a helpful marketing argument for the economic area of Zurich. The Swiss internal ‚borders‘ such as municipalities and cantons, have grown historically and are more and more washed away by the economic development. In order to countervail the developing economic functional spaces political spaces must be established, which likewise represent a superior spatial level that is not limited by any municipal or cantonal borders. Since the EMRZ has no such institutional structure private organisations together with the participation of political bodies have established (like THE ZURICH NETWORK, see URL: [WWW.ZURICHNETWORK.CH](http://WWW.ZURICHNETWORK.CH)).

# **3 The European Metropolitan Region of Zurich**

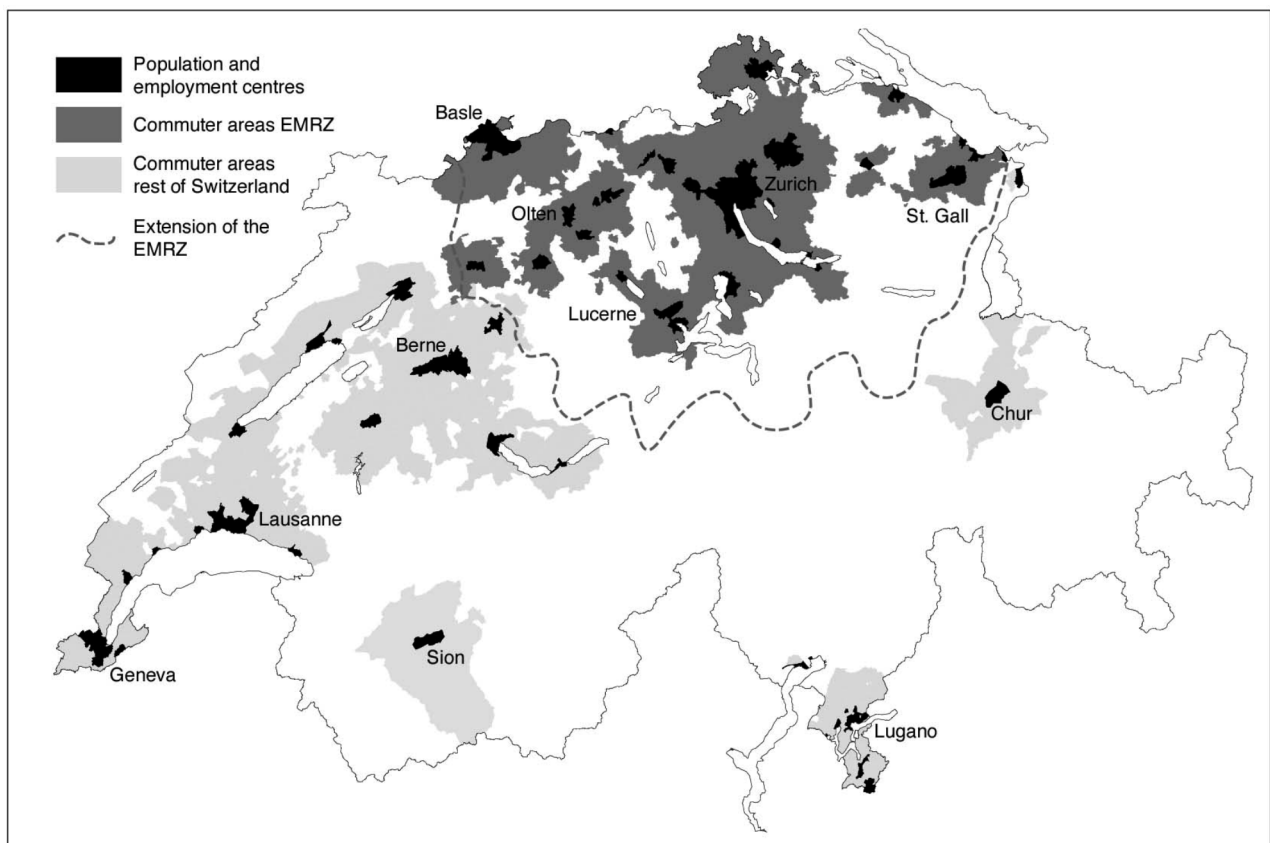
## **3.1 Delimitation due to the commuter traffic**

For the empirical identification of the clusters a first geographic delimitation of the European Metropolitan Region of Zurich (EMRZ) has to be defined (DÜMMLER, THIERSTEIN, 2002): first it was calculated which municipalities are located within a 60 minutes reach by car, starting in the city centre of Zurich. Second - to take into account the aspects of functionality - an approach similar to the GEMACA concept was adopted. This means commuter traffic data was analysed with regard to

the different cross municipal linkages between place of domicile and place of work. This analysis helped in refining the EMRZ delimitation.

Figure 1 shows the expansion of the EMRZ as a result of the above procedure. For 1990 it can be stated, that there exists an almost continuous space of so called Functional Urban Regions (FUR). A FUR covers the black dyed population and employment centres as well as the brighter dyed commuter areas where the commuters mainly live. A commuter area was only mapped if more than 10% of the workforce living in the respective municipalities commuted to one of the population and employment centres.

**Figure 1 Delimitation of the European Metropolitan Region of Zurich**



Source: own calculations; Data: Swiss Federal Office of Statistics (1990); Cartography: Lars Glanzmann.

The FURs of Zurich, Winterthur, Schaffhausen, Zug, Lucerne, Basle, Aarau, Olten and Langenthal are all continuously linked. Apart from this meta-FUR, a second meta-FUR consists of Solothurn, Berne, Thun, Fribourg, Biel, Neuchâtel, Lausanne and Geneva. The FURs of Kreuzlingen, Wil (SG), St. Gall, Chur, Lugano, Ascona and Sion are of a much smaller scale.

However the result of this FUR analysis must not be overestimated for the EMRZ delimitation. For example the FURs of Zurich, Wil (SG) and St. Gall probably have close functionalities, although their respective FURs are not linked geographically. Additionally it needs to be stated that the EMRZ probably also covers the southern parts of the German Bundesland Baden-Wuerttemberg as well as parts of the French Departments Haut-Rhin and Territoire de Belfort. An empirical evaluation in this respect however is still lacking. Nevertheless the cartographic mapping of the FURs shows that the 60 minutes radius may well be used as a simple approximation for the expansion of the EMRZ, at least within Switzerland.

The EMRZ thereby is a polycentric area, encompassing highly concentrated urban areas, semi rural areas as well as hybrid urban landscapes, as for instance the emerging Glatttalstadt northeast of the city of Zurich. The EMRZ combines - as the empirical analysis below shows - the qualities of the geographical proximity to the large city of Zurich with the external effects of technological proximity in different activity fields such as chemical and pharmaceutical industry, machine manufacturing industry and the financial services industry.

### **3.2 Meta-functions of the EMRZ**

Since functionality takes centre stage in the EMR concept, we will analyse the EMRZ accordingly to the three functions mentioned in section 2.1: the innovation (divided into high-services and high-tech), the gateway and the regulation function (DÜMMLER, THIERSTEIN, 2002).

To identify the cluster potential for one of the functions the location quotient was computed for each function (encompassing companies of the respective branches) and municipality on the basis of the people employed in these functions. The location quotient expresses the relationship between an area's share (e.g. a municipality) of a particular industry and the national share. Thus, the

location coefficient for a given area equals the percentage employed in an industry in a given area divided by the percentage employed nationally in that industry.

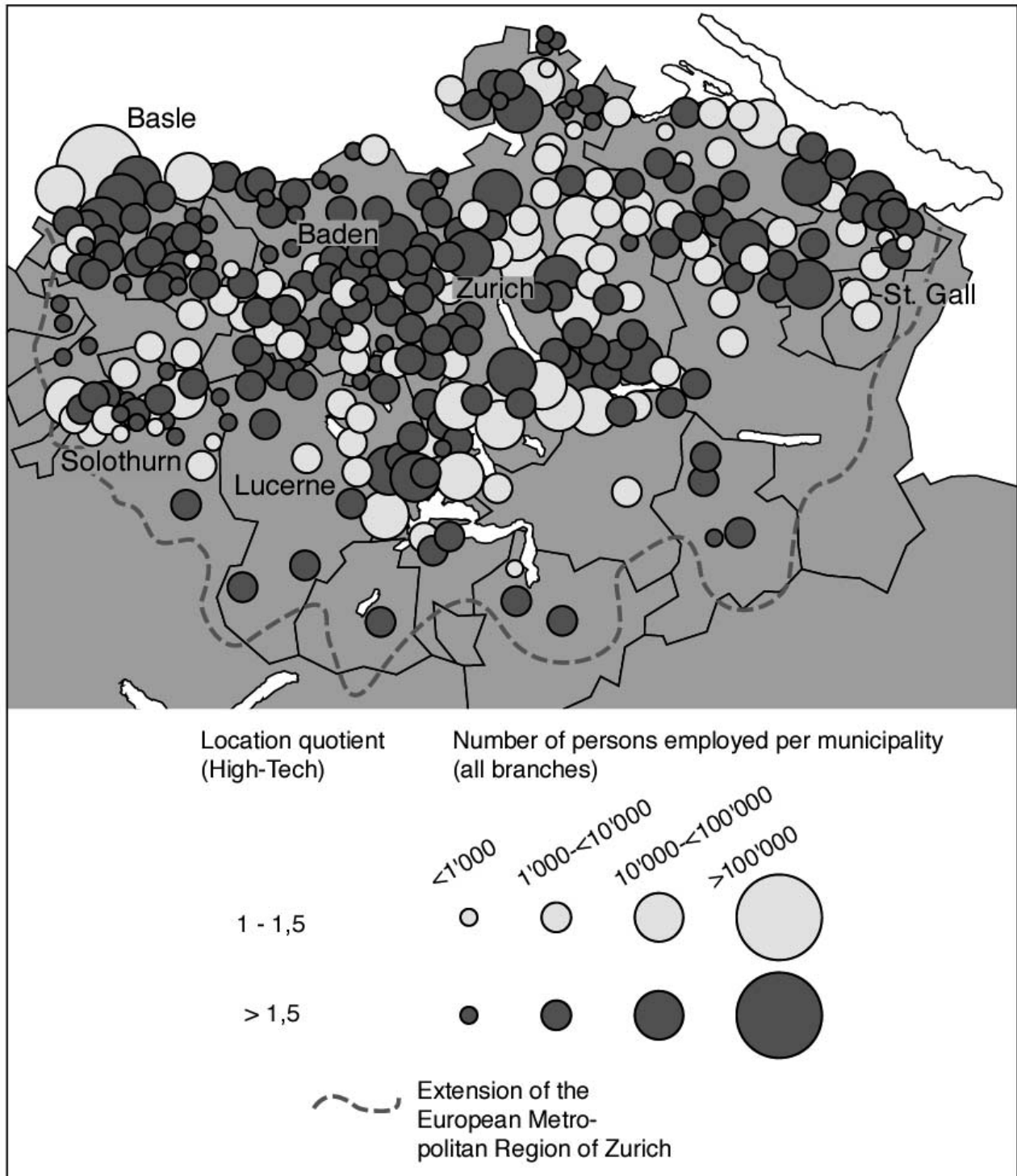
The location quotient therefore shows whether the function in an examined municipality is over (> 1), equally (= 1) or under-represented (< 1) compared to the whole of Switzerland. A location coefficient of 1.5 indicates that 1.5 times the percentage of workers is employed in that specific function than the percentage employed nationally in that function. The basic data used for this calculation were taken from the federal census of companies in 1998.

The location quotient for the innovation-function *high-services* in the EMRZ is with 1.09 slightly above the Swiss average. Especially the cities of Zurich, as well as the surrounding agglomeration municipalities have a high location factor. In this region many persons are employed in banking, insurance, software engineering or real estate management companies. Larger companies often have a business location in the centre of the city of Zurich to take care of customer relationships, whereas back office activities are located in the agglomeration. Other focal points with many employees in the high-services sector are Basle, Zug and Lucerne.

The location quotient for the *high-tech* function amounts to 1.12 for the entire EMRZ. Figure 2 depicts the distribution within the EMRZ.

Figure 2 shows, that people employed in high-tech companies are spatially more scattered within the EMRZ than it is the case for the high-services function where employment density is more centralised. However it is worth mentioning that most of the companies are located along the line Basle-Zurich, in particular in the region Baden and Brugg. That is where highly specialised companies of the machine and the electrical equipment manufacturing industry are situated. In and around the city of Basle the chemical and pharmaceutical industry dominates (see also section 5). Contrary to Basle the city of Zurich has a very low quotient for high-tech, probably because real estate prices are too high for this kind of economic activity in the city (DÜMMLER, THIERSTEIN 2001).

**Figure 2** Location quotient for the high-tech function of the EMRZ



Source: own calculations; Data: Swiss Federal Office of Statistics (1998); Cartography: Lars Glanzmann.

The activities that define the *gateway-function* have a location quotient of 1.02 and are therefore only very little above the Swiss average. The employees in the respective companies concentrate mainly in the city of Basle with its airport, the river Rhine harbour and many international logistics companies. The region of Olten is also above the average, fulfilling important functions for the Swiss Federal Railways and being the location of many Swiss distribution centres, like for the Swiss Postal Services. The region of Zurich gets attention due to the international airport in Zurich-Kloten that accounts for almost half of the jobs in this municipality.

The location quotient for the *regulation-function* amounts to 0.81 for the EMRZ. This function is particularly pronounced in the canton and district capitals, where a large part of the public administration and regulation authorities are. Very often private organised interest groups are located close by, not only to influence public regulation but also to set regulating standards among their members. The city of Zurich itself has a location quotient of about 1. This can be explained with the relatively small portion of employees in regulating institutions compared to the whole number of employees in the city.

To sum up the analysis of the location quotients for the EMRZ: despite the high aggregation level of the data used and the large geographical expansion of the EMRZ the innovation-function is strongly and the gateway-function weakly above Swiss average. Only the regulation function of the EMRZ is below the average. This latter result has to do with the fact that the Swiss capital city of Berne was not counted into the EMRZ. However if Berne is taken into account then the EMRZ (plus Berne) equals the Swiss average of 1. Therefore the EMRZ meets to a large degree the criteria set up for an EMR.

## 4 Cluster theories

This Section presents in a nutshell the basic theoretical elements for analysing economic clusters. The discussion about the role and function of clusters has been introduced mainly by the seminal work of LASUÉN (LASUÉN 1973). PORTER initiated its renaissance by combining LASUÉN'S cluster approach with more conventional demand and supply side economics and illustrations of ex-post case-studies of large and well known branch developments around the world (PORTER 1990). Ever since, clusters have become something of a hype for social scientists, promotion agencies and entrepreneurs alike. Although the definition of a 'cluster' rests vague, one can at least identify a dividing line along the dichotomy of analytical and normative-symbolic discussion.

A whole range of studies try to define and analyse on various spatial and activity levels the empirical content and reality of such clusters (HUTSCHENREITER 1994; VAN DEN BERG ET AL. 2001). On the other hand, it is the normative policy approach that tries to come up with some recommendations on how to identify, foster, promote and market such clusters. Wishful thinking to copy 'Silicon Valley' (ROGERS, LARSEN 1984) and to initiate a lasting turnaround still lingers around in many restructuring or economically depressed regions. The objectives may vary but centre around the following objectives: regional development, regional innovation networks, technological change, competitiveness and structural change, upgrading of regional or local labour markets (THIERSTEIN, WILHELM 2001).

But still, the concept of economic clusters stays quite vague and very much open to interpretation. The question thus prevails: what are the basic features of a cluster approach? At first and second glance it becomes clear, that clusters have connotations with spatial concentration of economic activities, functional relationships between actors, networking, mobilising localised and specific resources etc. Clusters have long since the days of MARSHALL developed and encompass not only

- the *manufacturing sector*, but as well
- the *scientific sector* with its important role on technological innovation,
- the *sector of producer services* which provide assistance or support to industrial firms for the development and/or introduction of new products or processes,

- the *institutional sector* which includes first formal institutions like employer associations, non-profit organisations or legal and regulatory frameworks, and second informal institutions including the prevailing set of rules, conventions and norms that prescribe behavioural roles and shape expectations.

The above lines of discussion form the vertical axis of table 1 below. The horizontal axis is formed by the fact that the discussion on innovation and clusters can be structured on the one hand along the dichotomy of territorial or localised based innovation systems and on the other hand along technology and sector oriented networks. One of the main discriminating criteria for the two approaches is the degree to which geographical proximity is perceived and valued as a precondition for the existence of a territorially based system (TORRE, GILLY 2000). A proximity that is only geographic in nature can provide the basis for the presence of an agglomeration of firms, but not necessary for the presence of a system of innovation (FISCHER 2001). In general, most definitions of clusters “share the notion of clusters as localised networks of specialised organisations, whose production processes are closely linked through the exchange of goods, services and/or knowledge” (VAN DEN BERG ET AL. 2001).

Recently, authors place the cluster approach within a broader framework of knowledge economies and of evolutionary approaches to socio-economic development (COOKE 2002; LAMBOUY 2002; VAN DEN BERG ET AL. 2001). One of the key problems with the cluster approach is the biased focus most empirical studies apply: the concentration on well-performing large-scale regions like the ‘Third-Italy’, Baden-Wuerttemberg, Silicon Valley, Research Triangle Park in North Carolina, or Cambridge. But in order to draw workable and viable conclusions from such cases it is necessary to adopt an analytical approach that goes beyond the economic activities and criteria most studies apply. Clusters thus should be studied in an integral way, from the view that clusters are embedded in the spatial-economic, cultural and administrative-political structures of an urban or even rural region. A very instructive example and a good starting point for that kind of analysis is SAXENIAN’s comparative study of Silicon Valley and Route 128 – Boston (SAXENIAN 1996). A comprehensive analytical framework for identifying clusters has been proposed by VAN DEN BERG ET AL. They assume that three interrelated elements influence the growth of a cluster (VAN DEN BERG ET AL 2001: 189):

1. *spatial-economic conditions* (demand conditions, quality of life, accessibility, cultural conditions);
2. *cluster-specific conditions* (size and development level, presence of cluster engines, degree of strategic interaction among actors, level of new firm creation); and
3. *organising capacity regarding the cluster* (presence of vision and strategy in a cluster, quality of public-private networks, level of societal/political support for cluster development).

Table 1 tries to synthesise the different aspects around the analysis and discussion of clusters.

**Table 1      The roles of clusters - a theoretical taxonomy**

Spatial logic ⇒		
Cognitive logic ↓	Territorial approach	Network approach
Functional approach	<p><b>CLUSTER</b></p> <ul style="list-style-type: none"> <li>• Diversification and specialisation of activities</li> <li>• Concentration of externalities</li> <li>• Density of proximity contacts</li> <li>• Concentration of tacit knowledge</li> <li>• Reduction of transaction costs</li> </ul>	<p><b>INTERCONNECTION</b></p> <ul style="list-style-type: none"> <li>• Cluster as a node in multiple and interacting technological, communication and economic networks</li> <li>• Cluster as interconnection between place and node</li> </ul>
Symbolic approach	<p><b>MILIEU</b></p> <ul style="list-style-type: none"> <li>• Substrate of collective learning</li> <li>• Uncertainty-reducing operator through: <ul style="list-style-type: none"> <li>- information transcoding</li> <li>- ex-ante co-ordination of private decisions (collective action)</li> </ul> </li> </ul>	<p><b>SYMBOL</b></p> <ul style="list-style-type: none"> <li>• Cluster as a 'landmark' for an innovative region</li> <li>• Cluster as a status symbol for local or regional promotion agencies and politicians</li> <li>• Cluster as a producer for symbols and codes of 'change towards a brighter future' and as 'change agent'</li> </ul>
Normative approach	<p><b>LEARNING REGION</b></p> <ul style="list-style-type: none"> <li>• Promotion of regional innovation and production systems (RIPS)</li> <li>• Support for higher educational system (HES) to foster human capital</li> <li>• Information and mobilising platform for local and regional actors of small size clusters</li> </ul>	<p><b>INTERNATIONAL COMPETITIVENESS</b></p> <ul style="list-style-type: none"> <li>• Ranking of international technological Centres of Excellence</li> <li>• Support of incubator centres, start-up or spin-off firms</li> <li>• International promotion platforms of locations and cluster competencies</li> </ul>

Source: own illustration.

In the following section we focus on some aspects of the spatial-economic conditions in the European Metropolitan Region of Zurich (EMRZ). The other elements of an integral analysis of clusters will be the issue in our further and ongoing research on clusters in the Zurich urban area.

## 5 Major clusters in the European Metropolitan Region of Zurich

For the identification of clusters in the European Metropolitan Region of Zurich (EMRZ) a quantitative approach is used. We first identify the most important industries in economic terms. Looking at Switzerland in general and at the EMRZ in particular it is the chemical and pharmaceutical industry, the machine manufacturing industry and the financial services industry (consisting of banks and insurance companies) that have the strongest economic significance (see table 2).

**Table 2** Relative size of the three industries in Switzerland (Switzerland = 100%)

	Chemical and pharmaceutical industry	Machine manufacturing industry	Financial services industry
Share of employment	1.8%	3.2%	5.1%
Share of gross value added	3.8%	3.1%	12.1%
Productivity per fulltime employment	200%	90%	240%

Source: own calculations; Data: Swiss Federal Office of Statistics (1998).

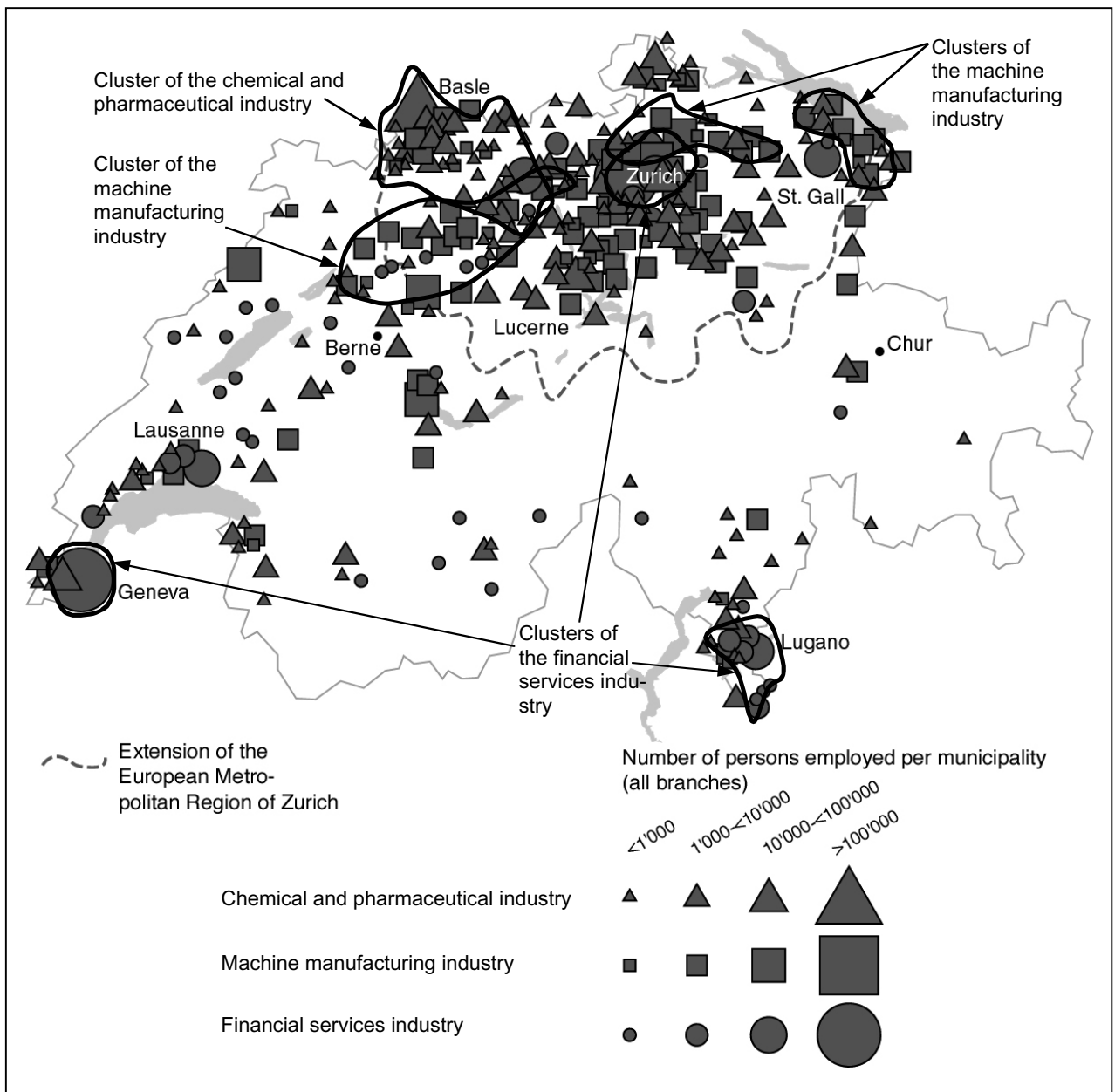
Table 2 shows that the chemical and pharmaceutical as well as the financial services industry have a remarkable high index rate of productivity per fulltime employment compared to the average Swiss rate. These two industries have therefore to be accounted for the economic boosters in Switzerland (DÜMMLER, SCHMUKI 2002). In order to identify the relative concentration ratio of the three above industries in the EMRZ, we calculated their respective location quotient for each municipality on the basis of the whole of Switzerland. Figure 3 shows the distribution of employees in these three industries, which all get a location quotient of above 1.5. Where a larger geographical accumulation of one of these three industries is identified, it is then being labelled a ‚cluster‘.

The Swiss *chemical and pharmaceutical industry* is well known all over the globe. The map above clearly depicts that on a quantitative basis of analysis it is only the Basle area with surrounding parts of the cantons Solothurn and Aargau that form the only large-scale cluster in Switzerland.

In contrast, the *machine manufacturing industry* is more evenly spread, being located in several regions of Switzerland. The lions share however is found within the EMRZ, where several clusters can be identified. The first cluster encompasses parts of northeastern Switzerland, including the Alpine Rhine Valley and going along the lake Constance. The second cluster is located Northeast of Zurich with a nodal point in Winterthur. A third cluster then is found Southwest of Zurich with a strong centre around Baden, although other studies include this cluster as part of the second cluster (CREVOSIER ET AL. 2001).

The *financial services industry* concentrates on the one hand in the city centres of larger cities for proximity reasons. On the other hand the same industry clusters in communities of the agglomeration for reasons of availability of space for back office activities. But the basic reason for the three separate clusters of the financial services industry spread across Switzerland is functional specialisation. While Zurich largely dominates the business domains of commercial and investment banking as well as insurance, Geneva and Lugano/Chiasso focus comparatively more on private banking and asset management (LAMBELET, MIHAILOV 2001; BEHRENDT 2002).

**Figure 3 Clusters of the three main industries in the EMRZ**



Source: own calculations; Data: Swiss Federal Office of Statistics (1998); Cartography: Lars Glanzmann.

## 6 Summary and discussion

### 6.1 The need for an integral approach

The empirical analysis of economic concentration within the European Metropolitan Region of Zurich (EMRZ) produced some useful results. The economic space of EMRZ seems to form a meta-cluster for at least three of the main sectoral clusters in Switzerland (see figure 3). Thus the EMRZ is playing the role of the major economic player and driver within this country, which gives the EMRZ a comparable function to other main European Metropolitan Regions like the EMRs Rhine-Main or Rhine-Rhur (HIMMEL et al. 2000). But even with a size of the EMRZ of 3.9 million inhabitants in 1998 – which will take Swiss people, politicians and officials quite some time to mentally internalise – the EMRZ still is small compared to the ‘champions league’ of the top 30 city-regions in the world. The Swiss EMRZ would not even enter the top 30, with London holding the 27th place with 7.3 million inhabitants (SCOTT 2001).

As we already mentioned at the end of section 4, the here presented analysis focuses solely on the quantitative aspects of the clustering of similar economic activities (horizontal clusters). We did not consider yet the backward and forward – with suppliers and customers as in vertical clusters – or upstream and downstream linkages – with firms of related branches as in lateral clusters – of these activities. In this sense, the applied method of calculating location quotients and travel time for commuters is limited. An exclusively statistical study does not help reveal the complementarities, which exist between the various activities in a region, regardless of whether these complementarities are to be found in purchasing/selling relations, in the technology employed and the related know-how or whether they are of a different nature. Thus in order to better grasp the more complex interrelationships of the various clusters and their relation in forming the meta-cluster of the EMRZ, it is necessary to follow the framework approach described in section 4. In doing so, it would be helpful to use a certain number of more qualitative data which in turn would mean to resort to two sources of information: interviews with regional experts and existing regional monographs.

## 6.2 ZURICH MEDNET - from quality also to quantity?

The discourse on concepts and theories of clusters leads to concluding that clusters come in 'all colours and shades'. Which means that an integral analysis will produce clusters of different sizes, be they small and barely recognisable on the quantitative level or be they large and internationally re-known. There is a saying: 'from small things big things come', which means that even Silicon Valley almost started from scratch.

So let us look at a very small example of that intricate and barely manageable process of the growing of an economic cluster: the ZURICH MEDNET cluster strategy (see URL: [WWW.ZURICHMEDNET.ORG](http://WWW.ZURICHMEDNET.ORG)). Recognised as a world leader in biotech and pharmaceuticals, Switzerland is also a significant producer and provider of medical devices, equipment and services. Equally important, the largest concentration of medical/bio-related industry in Switzerland is centred 40 kilometres from the Zurich Airport. This medical/biotech cluster, a community of more than 400 companies, hospitals, labs, medical-related service organisations, venture capital funds, banks and foundations, together with some of Europe's most prestigious universities, is ZURICH MEDNET.

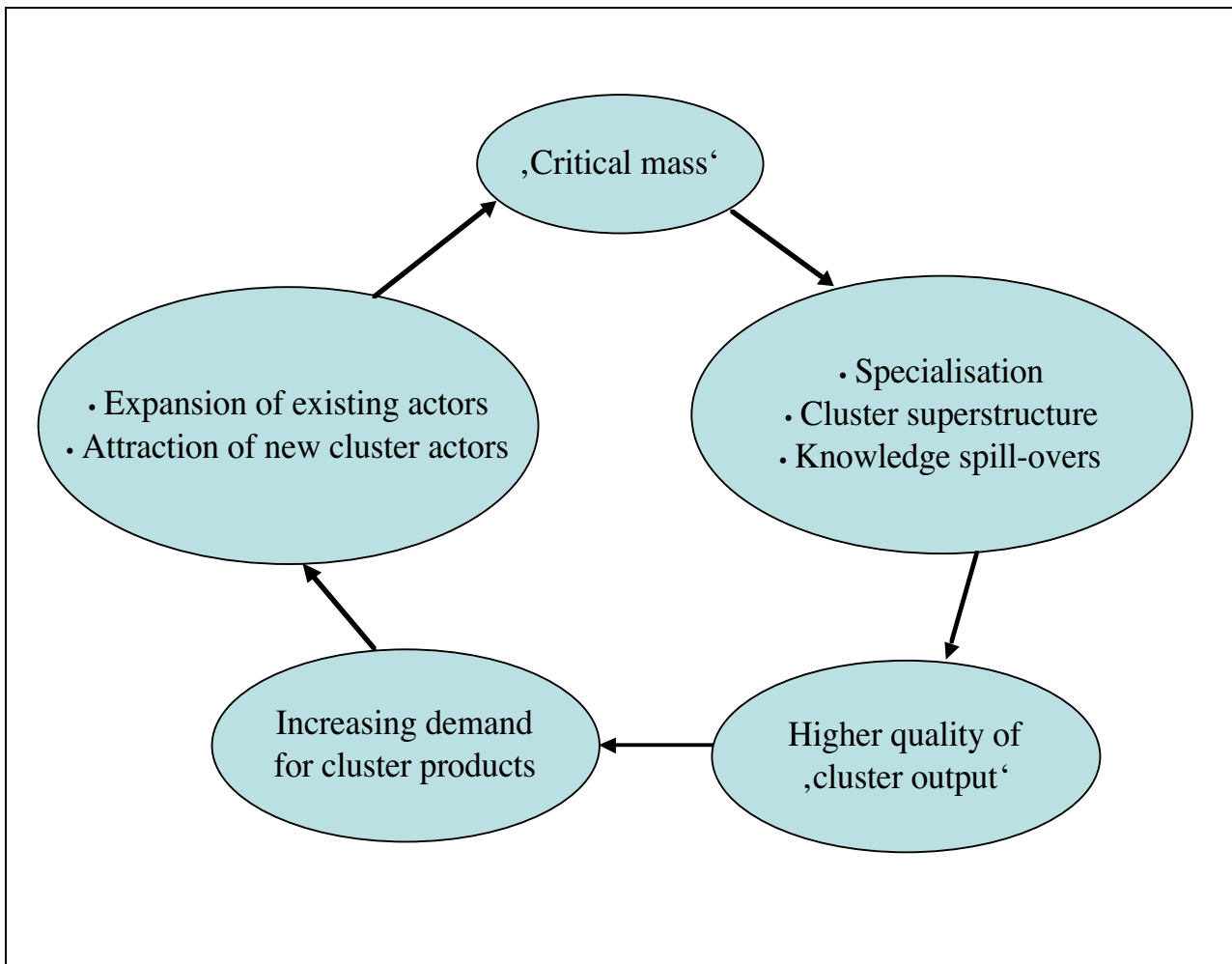
In December 1999, building on a close relationship between the cities of Zurich and Winterthur, ZURICH MEDNET became a medical/biotech cluster of THE ZURICH NETWORK, a non-governmental public-private partnership. Focusing on the importance of universities to business, ZURICH MEDNET was designed to promote economic development, while strengthening its economic competitiveness independently and in partnership with allied communities. Accordingly, in the beginning of 2000, ZURICH MEDNET developed the first prototype of ZurichMedNet.org, a web portal, and entered into a strategic alliance with the UNIVERSITY OF MINNESOTA's MBBNet.umn.edu, the largest linked, regionally based, medical/bioscience web portal in the United States (see URL: [WWW.MBBNET.UMN.EDU](http://WWW.MBBNET.UMN.EDU)). Together, ZURICH MEDNET and MBBNET represent the first web-based international industry/university cluster alliance in the world, and the first international web search linking of regional clusters ever.

Now if one looks at the location quotient for the quantitative concentration of medical/bio-related industries across Switzerland, the ZURICH MEDNET does not show up at all. Thus, on a strategic policy level, does this mean that there is no legitimacy for such a cluster? Or does it just happen that ZURICH MEDNET still is in its embryonic phase and thus not yet detectable in quantitative terms and therefore did the cluster not yet cross the threshold of being recognised as being one? These questions do not have definitive and precise answers but lead us to have an even closer look. Clusters tend to grow and it is exactly that growth pattern which interests researchers and politicians alike. But there is no uniform growth pattern due to the varying initial spatial-economic and cluster-specific conditions as well as the organising capacity of a cluster. But nevertheless, various empirical evidence from scientific analysis and case studies lead to formulate the following 'virtuous circle' for cluster development (see figure 4).

How does one interpret this 'virtuous circle'? Obviously there is no fixed starting point. Taking up the ZURICH MEDNET example described above, the critical mass to get recognised quantitatively is not yet reached. Thus the ZURICH MEDNET cluster, albeit being highly specialised, will have to further and enlarge its cluster superstructure – for example privately operated education and child caring facilities – and foster knowledge spillovers. Consequently this will lead to a higher quality and attractiveness of the MEDNET's output which in turn impacts positively on the demand of the clusters output in economic as well as in structural and knowledge terms. And again, attractiveness and success breeds success: the already existing actors within the ZURICH MEDNET cluster will thrive and new ones start up, spin off or locate within its area. Finally the 'virtuous circle' completes itself and a self-sustaining critical mass will be reached.

But to be precise, on the strategic level of location or regional policy it is not so important that a cluster such as ZURICH MEDNET is recognised by its pure size but by its excellence and network capabilities. And although a success story sets in motion a virtuous circle, there still is no deterministic development pattern. Empirical evidence is strong enough to send warning signals to all actors involved that success is not stationary and may carry the germ of failure. Lock-in phenomena (COWAN, GUNBY 1996; GRABHER 1993), conservatism among the key players and change agents will eventually lead to sclerosis and inertia.

**Figure 4** An ideal growth pattern for cluster development - the ‚virtuous circle‘



Source: own illustration.

To sum up, counting on a quantitative analysis of location quotients, the EMRZ can be regarded as a meta-cluster of several specialised economic clusters with regard to high-tech and high-services industries. But only a closer look with the help of an integral framework approach will identify the singular qualities and features within this meta-cluster. The ZURICH MEDNET serves as an example for a small-scale cluster that at first sight is barely ‚visible‘ but eventually surfaces and may thrive to become a first-class address even on an international level. There is no sure-fire way to guarantee success but smart cluster and location management will help some.

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