The relationship between supplier networks and industrial clusters: an analysis based on the cluster mapping method

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Abstract

Michael Porter's concept of competitive advantages emphasizes the importance of regional cooperation of various actors in order to gain competitiveness on globalized markets. Foreign investors may play an important role in forming such cooperation networks. Their local suppliers tend to concentrate regionally. They can form, together with local institutions of education, research, financial and other services, development agencies, the nucleus of cooperative clusters. This paper deals with the relationship between supplier networks and clusters. Two main issues are discussed in more detail: the interest of multinational companies in entering regional clusters and the spillover effects that may stem from their participation. After the discussion on the theoretical background, the paper introduces a relatively new analytical method: "cluster mapping" - a method that can spot regional hot spots of specific economic activities with cluster building potential. Experience with the method was gathered in the US and in the European Union. After the discussion on the existing empirical

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evidence, the authors introduce their own cluster mapping results, which they obtained by using a refined version of the original methodology.

Key words: cluster, transnational company, supplier network

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1. Introduction

Clusters have attracted much attention in the recent past. Besides the ever growing academic interest, clusters have also become primary targets of development policy. Various documents of the European Commission (EC 2003, 2007, 2008a, 2008b) expressed the strong confidence in clusters being exceptionally suitable drivers of economic growth, innovation and competitiveness. National governments, but also EC, supported policies designed to promote the process of clustering and the establishment of cluster organizations. Another important string of literature and policy practice is foreign direct investment (FDI) attraction and the development of local linkages (most importantly supplier networks) of foreign investment enterprises (FIEs). Both structures clusters, as well as widespread supplier networks, have common features. Most importantly, both need a sufficient number of potential collaborators. Both can be developed most successfully in regions where economic activity is vivid, enterprising and cooperation has traditions. The question emerges: what should and could be the relationship between the two cooperation systems? What are their common features and what about the differences?

Agglomeration of economic activity is a phenomenon which has occurred as long as human history. Centres of active and vibrant economic development and welfare have attracted various businesses for centuries. As early as the work of Marshall (1890), there was an awareness of the importance of geographical proximity in determining the location of industrial activity. Marshall argued that clusters develop as a consequence of three factors: (a) the presence of a skilled local labour market, (b) key inputs from suppliers and (c) rapid know-how transfer between firms leading to technological spillover. Hence, regional concentration is not a new phenomenon.

The industrial clustering work of Porter (1990, 1998 and 2003) is regarded as seminal. Porter emphasized that the firms' competitiveness was determined by multiple factors only partly endogenous to them. In his "diamond model", four sets of interrelated forces were brought forward to explain industrial dynamics and competitiveness. These were associated with factor input conditions, sophisticated local demand conditions, related and supported industries and firm structure, strategy and rivalry. A core notion arose around his

model stressing that a collaborative, mutually supportive group of actors could enhance regional competitiveness in global markets and thus creates growth and other benefits. Also, the significance of face-to-face contacts and personal demonstration, exchange of experience, the role of geographical proximity for knowledge transfers and innovation have been explored and emphasized. Another string of related economic thought elaborated on knowledge creation and innovation as a social process engaging individuals that exchange tacit and explicit knowledge. Trust-based relationships and social capital may thus be important for enabling horizontal cooperation between individuals within and across firms and institutions (Pouder and St. John, 1996; Saxenian, 1994).

Clusters are spatial concentrations of business and related institutions with activity specialization and active cooperation linkages among cluster members[1]. Nevertheless, the clusters' activity may be facilitated by cluster organizations (cluster initiatives), the later being institutions rather than economic phenomena and, therefore, a clear distinction must be made. The essence of clusters is cooperation of members, the main benefits that they achieve stem from joint actions. Foreign investment enterprises (FIEs) may also benefit from cooperation with clusters related to their core activity. Nevertheless, the linkage is more often the opposite. Local companies and more importantly, governments promote joint actions sometimes organized as clusters, in order to facilitate cooperation with FIEs. One of the main FDI-related policy aims is to promote their getting more embedded into local economic environment and loosen their island-like appearance in the host economy. Developing local linkages, however, requires actions on behalf of both sides, FIEs and local firms as well. Governments usually have greater influence on local small and medium sized firms and can better facilitate their efforts to become suppliers of FIEs. An interesting new tool in this effort is cluster promotion, and their potential role in facilitating FIE local supplier networks[2].

We can approach clusters on different levels. Since co-location of business in close geographical proximity is an organic development, we can focus on real economic clustering process, i.e. how spatial concentrations of certain activities evolve or show up in a given time of observation. This is an important aspect since benefits of close cooperation among firms are expected to arise when cooperating agents exceed a certain number, the "critical mass"[3]. We

[1] Michael Porter's original definition for clusters is as follows: „Clusters are geographic concentrations of interconnected companies, specialized suppliers and service providers, firms in related industries, and associated institutions (for example universities, standards agencies, and trade associations) in particular fields that compete but also co-operate" (Porter, 1998, 199). The main aim of this cooperation is enhancing competitiveness of regions and actors in the region.

[2] For more details on supplier network promotion programs in Hungary see: Sass and Szanyi (2004), ICEG, (2006); Sass et.al. (2009).

[3] One main precondition of successful cluster operation is the presence of a fairly large and diverse pool of economic agents specializing on similar or supportive activities. The sufficiently large

can make observations using statistical analysis of activities on the local level. The first such extensive "cluster mapping" exercise was carried out in the US by Michael Porter's team at Harvard Business School. Since then, several similar calculations have been made by using Porter's original method. In this paper we review previous mapping exercises, and introduce our own results for Hungary.

In this paper first we briefly summarize the existing literature evidence on the relationship of the two structures. The second part deals with measuring regional density of economic activity using Michael Porter's measurement idea, the cluster mapping methodology. In this section we introduce the results of previous mapping exercises, as well as our own research results, which were based on a modified measurement method that expanded the number of measures and refined the database in geographic terms.

2. Clusters and supplier networks

Clusters are flexible production platforms with some kind of activity specialization. Cluster operation can be targeted directly to consumer markets but also to supplies of specific intermediate products. In some cases clusters are organized as an alliance of equal parties (i.e. firms with similar size and importance), in other cases the organization is more satellite-like and there is one or few large companies that determine cluster activities according to their input demands. In this later case, cluster participants and activities are organized in order to enhance the competitiveness of the whole value chain on top of which there are usually multinational companies. It is important to emphasize that FIE-centered clusters may work properly only on the basis of mutual benefits. Cluster cooperation, which is largely sponsored by the FIE must bring benefits for suppliers in terms of technological up-grading, market access, sometimes even financial support. Benefits of FIEs may range from access to less expensive and flexible local supplies to better labor force pool and technology assistance.

The clusters' essence is mutually beneficial co-operation between various economic actors. Hence, true clusters expand beyond the mere FIE supplier networks. They include non-business participants and their activity goes beyond technical organization of supplies. The most common is technology and knowledge transfer to facilitate small suppliers' technical and managerial capabilities. There is also financial support to undertake the necessary investments. However, in this type of cooperation there is relatively little

specialized local economic activity is crucial for knowledge generation and transfer, for the internal stability of cluster organizations, for the „visibility" of clusters and for the self-sustaining development of cluster activities. For more general descriptions and about various interpretations of the cluster concept see: Porter, (1998); Sölvell et.al. (2003); ICEG, 2007; Sölvell, (2008); EC, (2008b); Szanyi, (2008b).

emphasis on innovation and technological cooperation, at least for the time being.

FIEs may be also important players in the innovation process of clusters. They have always been regarded as primary sources of technology to the host transition economy. Whenever their local involvement increases interfaces of technological spillovers also widen. Hence, clusters may serve as good platforms of knowledge transfer between FIEs and local actors. The concept of dynamic clusters[4] emphasizes innovative cooperation among partners rather than one-way transfers of knowledge. It is not self evident that FIEs' strategies exceed the technical minimum of knowledge transfer towards suppliers. Their links to local universities or research laboratories also depend on many factors that are independent from cluster policies (Sass and Szanyi, 2004).

Transnational corporations are desired participants in clusters (Sölvell et al. 2003). They may support cluster development in several ways. They are in direct contact with world markets and can potentially bring breaking news to the cluster's first hand. Through their widespread international linkages these companies may support international activities of the cluster and smaller cluster members. They may even lobby for their partners' interests. Another potential support area is technology. Transnational companies have usually cutting edge technology, and are able to provide technology and knowledge transfer to strategic partners. In the case of stable supplier contacts, technology transfer and enabling policies provided for suppliers are rather usual. The intensity of such linkages very much depends on their level of inclination for supplier network development with nationality, global strategy as perhaps the strongest determinants. Another technology-related area is R & D. One of the essential cluster functions, especially in the case of dynamic clusters, is knowledge generation and distribution within the clusters. Should there be intensive R & D linkages within the cluster members, including research institutions and universities, it is likely that also transnational companies participate in this collaboration. Related to knowledge generation is training and education. This is also based on the cooperation of heterogeneous partners, also including transnational companies.

We think that, at least for the time being, emerging market economies do not offer strong conditions for knowledge based on dynamic clusters or

[4] Sölvell et al (2003) run the first major questionnaire-based empirical survey on clusters worldwide. Using the survey results they described a typical or best practice cluster type: the most common appearance of clusters. Because of overrepresentation of clusters from developed market economies, this model, which they called „dynamic cluster" reflected basically those characteristics, cooperation forms, structures that were found typical in more developed economies. Later research (e.g. Ketels and Sölvell, 2005; Ketels et.al., 2006) revealed the fact that in emerging market economies or developing countries clusters may substantially differ concerning their focus of activity and working models.

innovation systems that could provide strategic innovation inputs for transnational corporations, though many of them possess strong innovation communities that could potentially serve as knowledge generating network with international importance. Thus, TNCs' interest in developing deep cooperation networks including cluster participation is weaker in the emerging market economies than in the developed countries. Nevertheless, similarly to conditions for developing supplier networks, also cluster participation is plausible and desirable, albeit likelihood and modes of participation may greatly vary. In the next section we compare conditions of supplier network development with those of cluster establishment from the angle of transnational corporations. This comparison will also highlight possible ways of organizing clusters based on the existing supplier networks of TNCs.

In general, we can expect that factors increasing the likelihood of supplier network development also increase propensity of cluster involvement. However, the two phenomena are not identical, and in some cases interests may substantially differ. It is therefore necessary to consider these determinants also from the cluster viewpoint. These are the following: spatial concentration, specialization, heterogeneity of actors, simultaneous competition and cooperation, critical mass and typical cluster activities.

As far as the geographic concentration is concerned, we can immediately realize that in Hungary the main areas for FDI are identical with those of intensive cluster development. It is mainly the capital city, and the Northern and Western Transdanubia region where both clusters and FDIs accumulate. In fact, investments had already started to settle in important agglomerations in the 1990s, while cluster development (meaning formal cluster initiatives) started only after 2000. Causal relations are rather unclear, hence these regions used to be rather developed industrial centres already prior to the transition period, and their production potentials very much contributed to FDI attraction. Later, this attraction potential was further strengthened by the TNCs themselves. Leading original equipment manufacturers (OEMs) attracted their traditional suppliers to invest in the same region in order to ensure easy and smooth cooperation. This FDI pattern itself contributed to a large extent to the creation of sufficient pools of specialized firms within close vicinity. OEMs also exercised a strong pulling effect on local suppliers. While many of them had their premises in these historic industrial districts, new firms also settled into them. This process was strengthened by some policy measures as well. For over a decade or so, special industrial zones enjoyed special privileges in the form of tax and customs relief, provided they exported their output entirely. Tax free zones became hubs for green field investments, that also incorporated many Hungarian suppliers (Antalóczy and Sass, 2001; Sass, 2003).

Much of the export-oriented green field investment was carried out in the tax free zones; however, we also have to note that some 100 such zones were

created in Hungary, since regulations for the establishment were rather easy to meet. Therefore, the likely pattern of spatial concentration was one OEM and its traditional first tire suppliers, furthermore local second and third tire supplier companies. Only on rare occasions did it settle OEMs with similar final product into the same hub. They separated themselves from their competitors, and seemed to prefer separation from their supplier network as well (Szalavetz, 2001).

Consequently, significant concentrations of specialized firms were created in Hungary's more developed areas. These networks consisted in technologically dependent suppliers of the value chain of single OEMs. The types of cooperation also served the smooth functioning of the chain. Technology and knowledge transfer was provided by the OEMs and other major firms to Hungarian smaller suppliers in the areas and to the extent to which it was necessary to improve their supply capabilities. The knowledge transfer, but generally speaking, all cooperation links were vertical: the OEM being in the centre, and other firms depending on them as satellites. Not only did OEMs avoid contacting other OEMs of their branch, but horizontal linkages of suppliers were also curtailed (at least not promoted). This refers to contacts other than TNCs, but also linkages among suppliers (for example in the case of Electrolux[5]). There is some evidence that TNCs liked sporadic suppliers also because they could bargain lower prices when handling with separated, individual companies (Szanyi, 2008a). Summing up, FDI created hot spots for potential cluster development, but TNCs were not really interested in creating cooperation and communication platforms among supplier firms, which would be an essential cluster function.

We must emphasize the role of the tax free zones in spatial development of industrial districts in the first phase of the transition period. The advantageous regulation was however, lifted while joining the European Union, since it was not regarded as compatible with competition rules. Also, in this period there was another pattern of FDI in Hungary which was more connected with the privatization process, and was regarded as more likely to lead to the development of supplier networks. From the point of view of the development of horizontal linkages, or the possibility of becoming suppliers for several firms, various OEMs, there is anecdotal evidence proving that the linkages were more frequent in these cases. However, TNCs, in many of the privatization cases, were not more interested in the further development of suppliers' horizontal linkages. Nevertheless, "inherited from the past" cooperation among some of the local based suppliers might remain intact. Hence, propensity around these OEMs can be more likely than in the case of green field investments.

[5] See for details: ICEG, 2006.

Another aspect of cluster development is the heterogeneity of its members. It is rather clear that supplier networks around TNCs serve primarily the business interests of the integrating company. Anything which is beyond this interest must be initiated by other parties. The day-to-day interest of TNCs is simple: they must run their production facilities smooth efficiently (many of them are efficiency seeking). They need reliable business partners in the value chain. But basically, and especially in the early years of their investments, they do not care much about the broader background. Many TNCs regard investment projects as one of the deals that last until favourable conditions prevail, but do not intend to get involved in supporting the longer term provision of the conditions. Therefore, institutions of the broader production background (education, infrastructure development, etc.) remain outside their attention. Therefore, in the usual early phase local production networks usually lack diversity, which would be an important feature of clusters.

This situation is changing with the age and development of investment projects. There is a lot of empirical evidence which shows how even green field investments changed their nature and behaviour (Szalavetz, 2005; Szanyi, 2003, Hunya, 2001). This is due to the fact that it is in their own efficiency seeking interest to tap cheap opportunities in (almost) the whole value chain. Therefore, they expand activity from final assembly of imported parts to increasing local component supply, to increasing local participation in corporate functions (from accounting through logistics even to R & D). This expansion of the affiliates' activity in the global corporate networks is in line with the current wave of concentrating on core competences and outsourcing/offshoring many of the activities (Sass, 2008). The more activities are carried out locally, the more it is likely that business and cooperation links are developed in various directions exceeding the simple technological cooperation of suppliers. Whenever there is more room for contacts among heterogeneous market actors, potentials also increases for organizing these contacts and actors in some formal ways. Clustering process may get started from the bottom, too.

Recent experiences with labour shortage in some industrial bases in Hungary opened up new frontiers of cooperation with TNCs. National Instruments in Debrecen, Siemens in Budapest, Nokia in Szeged, Audi in Győr are just a few examples when TNCs participated in shaping and also financing education programs of universities. Of course, they do this because they need further high quality labour supply. Another welcomed development pattern is the increasing participation of TNCs in financing and partly also carrying out R & D projects in Hungary. Some of the leading investors in Hungary established R & D laboratories in the country. This also substantially increased clustering potentials of some cities where sufficient educational and innovation background was present. We do not think that dynamic clusters will soon play an important role in Hungary's economic development. It is good if TNCs at least realize that

they may also benefit from cluster cooperation in Hungary, and become active members of clusters. Nevertheless, the mere fact that universities, R & D facilities, and maybe also other actors raised their interest also supports the cluster idea and increases chances for proper cluster actions.

Concerning the coexistence of cooperation and competition, Hungarian clusters may play a positive role. TNC supplier networks always supported intensive competition among local firms. Cooperation was rather lacking, though it was very much in the interest of local firms to improve their abilities in joint actions rather than individually. Clusters may play an important role in organizing various programs for the development of the participating SMEs. This is also in the interest of the TNCs heading the value chain. Other forms of cooperation, most importantly technology and knowledge transfer, maybe even generation is also plausible in supplier-based clusters, especially if cluster members can change their way of thinking of vertical flows, but recognize that there is also room for joint horizontal actions. The empirical evidence indicates that this is the most difficult task of cluster managers, since many of the potential cluster members are competitors and compete for contracts of the top OEMs or first tire foreign suppliers. Finding ways of making TNCs interested in cluster cooperation is sometimes not more difficult than trust building among competing local suppliers.

As far as the critical mass of clusters is concerned, there is very little information on this issue in Hungary. Empirical surveys indicated that formal cluster organizations do not set such targets (Szanyi, 2008a). Many are in their early stage of development, thus the question is not yet relevant for them. Nevertheless, we can draw some general conclusions using guidelines of the literature (Sölvell, 2003, ECOTEC, 2003; CLOE, 2006).The achievement of a critical mass is important for three reasons. One is stability (against potential dropouts of large, dominating firms), the second is self-sustaining cluster (financially and also in terms of new entry attraction), the third is achieving also a critical mass of information flow and activity (a kind of density of cluster actions that provides the desired synergies). TNC supplier networks alone have little chance to achieve these goals. The membership of the competing OEMs is not likely. However, there may be clusters that are not initiated and dominated by OEMs, but are established by other parties, building on suppliers to TNCs. In this case the initial favourable condition of the supplier network is utilized, namely that there is a pool of potential cluster members. By using this pool, a cluster can be organized with or without the participation of the TNC itself. The case of the oldest and largest Hungarian cluster - the Pannon Automotive Cluster (PANAC) - is a good example for this. However, even this cluster could not develop activities more complex than supplier network support for many years. It took time and some setback in the cluster's activity until cluster management realized that proper cluster functioning cannot be based solely on supplier

network development programs (Grosz, 2006). Representing the cluster's own interests as separate organization is crucial, and cannot be subordinated to one company's business interests. Also, professional cluster management is necessary to be employed, thus regular cluster functions being developed.

In the second section of the paper we try to fill the information gap concerning the existing critical mass of firms and economic activity. We introduce the results of our large scale cluster mapping exercise based on the data from the Hungarian Tax Office which included all economic agents who worked with double book-keeping. Before doing this, we briefly introduce the results of some other cluster mapping studies.

3. Cluster mapping

While the origins of clustering included mostly bottom-up organizations, increased interest in cluster development, as a policy tool, resulted in large numbers of clusters that did not have traditional or organic spatial development roots. Many times, it was governments that boosted the organization of cluster initiatives. If countries wish to launch a thoroughly designed program, information has to be gathered and evaluated first. For the purpose of promotion of the clustering process, or the foundation of cluster organizations, it is necessary to check if conditions for clustering are provided) or not. Two characteristics are crucial. The first is spatial concentration, the second is specialization on some core competence. It is rather obvious that, in the case of a top-down initiative, these characteristics can be controlled in advance. It is quite surprising that cluster mapping has not yet become a general practice by governments. It is only in the USA, where nation wide effort was made in the late 1990's. Some countries also calculated spatial concentration measures, but even these efforts were not always given the right attention by policy makers. For example, in Hungary, there was such an effort in 2003, but it was conducted when the cluster promotion program had already been opened for applications (Ravn and Petersen, 2005). An *ex-post* survey compared the identified clusters with the list of existing cluster initiatives. Only 10 of the then 22 Hungarian cluster initiatives matched the hot spot map, which identified 24 examples of the above average spatial concentration of industries (Gecse, 2004).

The above mentioned weak result of match by actual cluster initiatives and statistically registered spatial concentrations raises the question of how to explain this failure? Was it the inappropriate analytical framework that created distortions in the mapping procedure? Or rather, it was due to a high number of "virtual cluster initiatives"? Or maybe, and most likely, do both explanations contribute to an overall explanation?

Without going into detail, a brief overview of methodological problems is due here. The cluster mapping procedure tries to identify spatial locations where the representation of certain industries or economic activities is higher than the

average, i.e. where they seem to concentrate. The logic is simple: in these places there must be some kind of a competitive advantage that is perceived by economic actors, and they tend to co-locate. There are three types of industries that have different reasons to co-locate. A large number of manufacturing branches and even more service providers (typically personal services) are located right at their markets. The dispersion of such industries is roughly even in all regions. The per capita measures for example are very close to each other in the various geographic regions of a country. Natural resource based industries, on the other hand, tend to concentrate mainly on the location of the valuable asset. These industries may serve the global market, but they do not have many choices in terms of location. The third group of activities is the most important for us, since these are industries that concentrate on locations, hence, they choose among many potential sites. These industries are regarded as cluster-industries. In the case of the US economy, their proportional share in employment was close to one third, but they recorded higher than the average wages, productivity and innovation (Ketels and Sölvell, 2005).

Ketels and Sölvell (2005) run a comprehensive statistical survey of cluster mapping in the 10 new member states of the EU. Their methodology was based on the methods of a survey that was conducted at the Institute for Strategy and Competitiveness at Harvard Business School led by Michael Porter[6]. The European survey used the amended American industrial classification method when identifying those business activities which belonged to cluster-industries. Spatial concentration was calculated for the European NUTS-2 level regions. Only employment data was readily available at this level of both sectoral and geographic disaggregation (38 businesses), and for two more recent comparative years (2000 and 2004). Thus, concentration was measured with this single data set. However, the authors calculated three different measures, in order to limit some of the distortions stemming from the special features of employment data. They wished to obtain a balanced picture of the regions reaching sufficient specialized critical mass to develop the type of spillovers and linkages that create positive economic effects and can serve as a basis for cluster initiatives. The first measure expressed the size: if employment reached a sufficient absolute level that may trigger strong economic effects of clusters. This level was set for each NUTS-2 region and every of the 38 branches at 15000 employees at a location. The second measure expressed specialization: if a region was more specialized in a specific cluster category than the overall economy across all the regions, this was thought to provide enough strength for the regional cluster to attract related economic activity from other regions. This notion was operationalised by regarding fit those concentrations that reached a specialization quotient of more than 1.75, i.e. which had at least 75 % more

[6] See: http://data.isc.hbs.edu/isc/index.jsp.

employment within the given cluster, than the average of all regions would suggest, given their size. The third measure expressed dominance: if branches employ a high share of the given region's overall employment. The measure was set at the level of 7 % of the overall regional employment. The level of all three measures was set to separate the highest 10 percentile of all regional clusters.

As expressed also by the authors, the measurement method had several shortcomings. The first being the usage of solely employment figures, this created bias towards labour-intensive sectors. Another problem is the level of disaggregation in both dimensions. The 38 activity groups, or businesses, contain many issues that are rather heterogeneous. A deeper level of disaggregation was not possible, since the original grouping pattern (which was based on more detailed surveys of the US economy) could be transformed from the American SIC classification structure into European NACE only at this level.

As concerns the NUTS-2 regions, they are also too big in at least some countries and for some activities. In Hungary, for example, the NUTS-2 regions were artificially created as requested by the EU, but they consist of usually 3 former *comitats,* which used to be the historical integrating geographic and administrative unit. The new NUTS-2 regions are so young that their economies could hardly amalgamate. On the other hand, there is no convincing evidence on clusters spreading according to administrative borders either. Thus, maybe some clusters escaped mapping because they spread over two or even more NUTS-2 regions.

A further problem comes from the inheritance of previous industrial structures. In most socialist countries, production was heavily concentrated in large state-owned companies. In some cases these huge *combinates* were located in places of arbitrary choice, in other cases firms were created in the effort of these countries for self-supply in practically all commodities in the middle of nowhere. In many cases, these giants, or the remnants of them survived the turmoil of the transition process. In other cases the least mobile production factor labour stayed at places where they were settled during the years of the socialist industrialization. All this experience seriously distorted spatial concentration patterns from the hypothetical optimum, and the old patterns still exercise influence on spatial differences in the supply of production factors. Thus, we may have strong reservations as far as the applicability of the results of current cluster mappings are concerned. Ketels's and Sölvell's survey found nevertheless interesting results. We summarize them in the following. 367 regional clusters met at least one of the three hurdle rates for absolute size, specialization and dominance. They represented 5.86 mn employees, about 58 % of the total employment in the cluster sector of the 10 new member states. The capital regions of the largest countries lead the ranking of regions by cluster portfolio strength: Budapest the first, Warsaw the second, Prague the fourth

place. The largest seven cluster categories were food processing, heavy construction services, transportation and logistics, financial services, hospitality and tourism, metal forming, and building fixtures, equipment and services, and accounted for 50 % of all cluster sector employment across the EU 10. As it can be seen, it is mainly labour intensive branches with relatively lower level of productivity: a clear indication for sample bias (automotive or ICT employed much less people, albeit they used to be considered as the leading sectors for many clusters).

The research confirmed the existing hypotheses concerning the development gap between developed countries and the transition member states in the EU. The EU 10 economies had a specialization profile distinct from more advanced economies. Specialization was found to have a far stronger natural resource driven sector (20 % share in employment) than developed countries. Within the cluster sector (32 % share in employment) there was a stronger bias towards labour intensive and manufacturing driven cluster categories, while these countries were relatively weak in advanced services and knowledge of intensive cluster categories. Exceptions were made by the strongest clustering centres around capital cities. Also, in case of the Hungarian clusters, the above mentioned bias was less pronounced and specialization towards high value added services and industries was stronger (see the attached list below).

Tabel 1. Strong regional clusters and their specialization 2004

(Clusters qualifying for the top 10 % in all three measures)

Regions	Field of specialization
Czech Republic	
Liberec	Automotive
Liberec	Textiles
Ostrava	Metal manufacturing
Praha city	Education and knowledge generation
Praha city	Entertainment
Praha city	Financial services
Praha region	Automotive
Hungary	
Győr	Automotive
Szeged	Food processing
Székesfehérvár	Information technology
Lithuania	Apparel
Latvia	Entertainment
Poland	
Gdansk	Transportation and logistics
Katowice	Automotive
Lodz	Apparel
Warszawa	Financial services
Wroclaw	Automotive

Slovakia	
Bratislava	Financial services
Kosice	Apparel
Kosice	Metal manufacturing

Source: Ketels and Sölvell, 2005 pp. 62-65.

There may be several factors affecting the results of the above table, which seems to be rather rigorous. For example no Slovenian cluster qualified itself in all three dimensions. Ketels and Sölvell (2005) found convincing evidence on the correlation of spatial concentration and economic performance, by using the data of developed countries. However, spatial concentration had different historic reasons in practically all the EU 10 countries, and these traditions seem to have a much weaker causal link to the economic growth and performance today. For example, in the case of the strong position of the Kosice region in the Slovak Republic, we must not forget that this is one of the poorest regions of the EU 25. The Kosice steel mill and very few other industrial facilities are the single most important employer of the region where unemployment rates are extraordinarily high. Thus, we may observe cases where spatial concentration of business is the result of an overall meltdown of business activity in some regions, and not the beneficial outcome of deliberate co-location decision of independent cluster actors.

It is perhaps more useful to look at the regional centres' overall clustering performance. The next table contains the list of regional centres that attracted the largest cluster portfolio, i.e. businesses that qualified in one or more aspects of cluster measures.

Tabel 2. Regional clusters with the strongest portfolio in EU-10, 2004

Region	Total number of qualifications	Average qualification per regional cluster	Share of qualified clusters in total regional cluster employment (%)
Budapest	23	1,53	77
Warsawa	22	1,38	77
Katowice	21	1,4	81
Praha city	19	1,9	78
Lithuania	19	1,58	70
Krakow	18	1,29	68
Liberec	17	1,55	62
Lodz	16	1,6	71
Wroclaw	16	1,45	60
Poznan	15	1,15	72
Nitra	14	1,4	60
Bydgoszcz	14	1,27	58
Slovenia	14	1,27	56
Olomouc	14	1,4	45
Latvia	13	1,44	62

Gdansk	13	1,44	59
Praha region	13	1,63	43
Bratislava	12	1,5	65
Brno	12	1,2	56
Miskolc	12	1,09	51
Kosice	12	1,71	45

Source: Ketels and Sölvell, 2005 p. 26.

There are large differences within the EU-10 across regions and cluster categories regarding their level of specialization and spatial concentration. These countries show much lower specialization on specific regional clusters within regions and much lower spatial concentration on specific regions within cluster categories than the original benchmark US economy. If, as suggested by the authors, higher levels of specialization and concentration enable higher productivity and innovation, this is a serious concern. The same concern arises with regard to the EU-15 countries in comparison with the US, which is fully consistent with the performance gap relative to the United States.

The European Union picked up Porter's idea and its extension by Sölvell and addressed dynamic clusters (in EC terms "innovative clusters") one cornerstone of the more concrete and operative implementation plan of the Lisbon targets by the mid 2000's. The emphasis on cluster development via European means gave new impetus for cluster research as well. Based on the previous works at the Stockholm School of Economics new research institutions were created. The European Cluster Observatory started to work in 2005. One main research output of this institution is its cluster mapping database[7]. The database contains employment data broken down according to Porter's original categorization of "traded clusters" for the European NUTS 2 level regions. The same types of measures are calculated as what was used in Ketels and Sölvell (2005). Thus, the problem of using only one indicator (employment), as well as the too broad and rather rigid separation of regions still remained also in this database. Nevertheless, the availability of methodologically comparable data for the whole territory of the EU is an important new feature in the cluster research. Also, the database contains some basic evaluation of the registered clusters' exports and innovative activities, which help readers to identify the "true innovative clusters".

As far as the actual results are concerned, the data of the observed Hungarian clusters is summarized in the next table. As it can be seen, none of the spatial concentrations in Hungary qualified in all three measurement aspects in 2007 (in 2004 there were three). The number of two-star clusters also declined. Some of the 2004 two-star clusters lost one star, but in two cases (building fixtures and business services in Central Hungary) the 2004 clusters

[7] See: http://www.clusterobservatory.eu.

were not mentioned in the 2007 table. On the other hand, 6 "new" two-star clusters appear in the 2007 table. They are certainly not new in the sense that these spatial concentrations have been rather known, since they used to have rather solid and traditional background, and qualified from one to two-star level.

Tabel 3. Evaluation of the Hungarian clusters (2007)*

All regional clusters in Hungary								
1,2 and 3 star regional clusters								
Region	Cluster category	Employees	Size	Spec.	Focus	Stars	Innovation	Exports
Kozep-Magyarorszag	Transportation	50163	0,81%	1,23	4,00%	**	High	Weak
Kozep-Magyarorszag	Education	44476	1,00%	1,89	3,00%	**	High	N/A
Del-Alfold	Food	34101	0,68%	2,89	7,00%	**	Low	Weak
Kozep-Magyarorszag	IT	30735	1,00%	2,26	2,00%	**	High	Strong
Kozep-Dunantul	Automotive	17091	0,66%	2,85	4,00%	**	Low	Strong
Nyugat-Dunantul	Automotive	16741	0,64%	2,98	4,00%	**	Low	Strong
Kozep-Magyarorszag	Biopharma	14197	1,00%	2,61	1,00%	**	High	Weak
Kozep-Dunantul	IT	12535	0,61%	2,64	2,00%	**	Low	Strong
Kozep-Dunantul	Building Fixtures	11702	0,50%	2,17	2,00%	**	Low	Strong
Nyugat-Dunantul	IT	10995	0,54%	2,47	2,00%	**	Low	Strong
Nyugat-Dunantul	Lighting	6888	1,00%	6,17	1,00%	**	Low	Very strong
Kozep-Magyarorszag	Lighting	6832	1,00%	2	0,56%	**	High	Very strong
Del-Dunantul	Leather	3086	1,00%	10,32	0,95%	**	Low	Weak
Kozep-Magyarorszag	Finance	43439	0,61%	0,92	3,00%	*	High	Weak
Kozep-Magyarorszag	Entertainment	28559	1,00%	1,96	2,00%	*	High	Very strong
Eszak-Alfold	Food	22460	0,45%	1,73	4,00%	*	Low	Weak
Eszak-Alfold	Construction	18230	0,28%	1,07	3,00%	*	Low	N/A
Kozep-Dunantul	Metal	17403	0,44%	1,92	4,00%	*	Low	Weak
Kozep-Magyarorszag	Publishing	16886	1,00%	1,55	1,00%	*	High	Weak
Eszak-Magyarorszag	Food	16116	0,32%	1,51	4,00%	*	Low	Weak
Kozep-Dunantul	Construction	16020	0,24%	1,06	3,00%	*	Low	N/A
Eszak-Magyarorszag	Construction	15650	0,24%	1,11	3,00%	*	Low	N/A
Kozep-Dunantul	Food	15246	0,31%	1,32	3,00%	*	Low	Weak
Nyugat-Dunantul	Food	14718	0,29%	1,36	3,00%	*	Low	Weak
Del-Dunantul	Food	14374	0,29%	1,63	4,00%	*	Low	Weak
Del-Alfold	Construction	13783	0,21%	0,89	3,00%	*	Low	N/A
Eszak-Magyarorszag	Metal	13190	0,34%	1,57	3,00%	*	Low	Weak
Nyugat-Dunantul	Construction	12918	0,20%	0,91	3,00%	*	Low	N/A
Kozep-Dunantul	Transportation	12078	0,20%	0,85	2,00%	*	Low	Weak
Nyugat-Dunantul	Hospitality	11702	0,32%	1,47	2,00%	*	Low	Strong

Del-Dunantul	Construction	11151	0,17%	0,96	3,00%	*	Low	N/A
Del-Dunantul	Finance	9012	0,13%	0,72	2,00%	*	Low	Weak
Eszak-Magyarorszag	Chemical	6130	0,64%	2,97	1,00%	*	Low	Weak
Eszak-Magyarorszag	Communications	5910	0,74%	3,47	1,00%	*	Low	Very strong
Kozep-Dunantul	Communications	5890	0,74%	3,21	1,00%	*	Low	Very strong
Nyugat-Dunantul	Heavy Machinery	5341	0,64%	2,97	1,00%	*	Low	Weak
Eszak-Alfold	Heavy Machinery	4362	0,52%	2,02	0,92%	*	Low	Weak
Del-Dunantul	Communications	4333	0,54%	3,09	1,00%	*	Low	Very strong
Del-Alfold	Constr, Materials	3863	0,64%	2,72	0,89%	*	Low	Weak
Nyugat-Dunantul	Communications	3475	0,44%	2,01	0,87%	*	Low	Very strong
Kozep-Magyarorszag	Jewelry	3445	1,00%	1,75	0,28%	*	High	Weak
Eszak-Magyarorszag	Lighting	3357	0,65%	3,04	0,85%	*	Low	Very strong
Eszak-Alfold	Lighting	3084	0,60%	2,3	0,65%	*	Low	Very strong
Eszak-Alfold	Footwear	3066	0,70%	2,71	0,64%	*	Low	Weak
Del-Alfold	Oil and Gas	2372	0,67%	2,84	0,55%	*	Low	Weak
Del-Dunantul	Fishing	1369	0,38%	2,16	0,42%	*	Low	Weak
Eszak-Alfold	Leather	1167	0,69%	2,65	0,24%	*	Low	Weak
Nyugat-Dunantul	Leather	1041	0,61%	2,83	0,26%	*	Low	Weak

Source: http://www.clusterobservatory.eu

*: A brief description of the calculation method is provided in the text. In the case of size, one star was given to clusters that belonged in this regard to the top 10 % of all clusters in the EU concerning this feature. The % figure in this table shows the actual share of the given Hungarian cluster in Europe's total (total employment in the given sector in all European clusters). In the case of specialisation, values over 2 earned one star. For the notion of focus those clusters got one star, which belonged to those 10 % of clusters that contributed the most to total local cluster employment. The % figure in the table shows the actual share of the cluster in the employment of the region.
Those clusters that also appeared in Ketels and Sölvell's 2004 table are in bold.

Looking at the 2007 list of Hungarian clusters, we can observe the still strong positions of traditional sectors. This is despite of the less favourable development tendencies during the 1990's and 2000's. The strong path dependency is observed here. Despite the massive foreign investments in some global industries, like automotive, electronics and communication technology, important features of the Hungarian economy prevailed: food industry, construction, light industry still retained important positions despite heavy contractions during the past 15 years.

Another important message of the table is that innovation was found strongest mainly in the sectors that did not export much and did not belong to traditional high technology activities. The loose relationship between high-technology, innovation and exports calls for caution when designing cluster promotion tools aiming at "export-oriented innovative clusters", which is at the

heart of the current Hungarian but to some extent, also European innovation policy (see for example EC 2008a, 2008b, European Cluster Observatory, 2007). Porter stressed the importance of innovation in cluster activity, but never mentioned that clusters were "reserved" for high-technology activities, or for export-oriented industries. At the heart of his concept is joint action for increasing regional competitiveness in general. One tool of this strive is supporting innovative cooperation in a wide range of industries and activities. Equally important in the cluster concept is its basing on traditional regional sources and areas of competitiveness. These should be promoted by cluster cooperation. Clusters should not be regarded as means of "capitalist industrialization".

As a conclusion, we can suggest further research in mapping spatial concentrations of business activity in the "traded cluster" sectors. It seems to be necessary to use alternative indicators like sales turnover, investments or paid salaries (instead of the number of employees). Also, the strict administrative boundaries of the NUTS 2 regions should be treated more flexibly in order to allow the observation of "cross-border" clusters, or less spread spatial concentrations that "disappear" from calculations when comparing them with aggregated figures of larger areas. Such refinements in methodology will enhance a more reliable comparison between the functioning of cluster organizations and their background. This would, in turn, also contribute to a better formulation of cluster policies.

4. Hungarian cluster mapping evidence

We analyzed the 1998 and 2005 database of the Hungarian Tax Office by using Porter's measurement method, which was described in the previous section. When transforming the industry categories of the database into the one that was defined in the HBS cluster mapping project, we could separate 37 out of the original 38 traded cluster activities[8]. Out of the three measures that were used by Ketels and Sölvell (2005) we used only one, the specialization quotient[9]. We

[8] For a thorough description of the traded cluster category see: http://data.isc.hbs.edu/isc/index.jsp.

[9] The design of the locational quotient is similar to Bela Balassa's RCA measure (revealed comparative advantage). It expresses the relative weight of one single sector in a region to the total weight of the region, compared to either the national economy or a larger geographical area. The calculation is as follows:

$$LQ_{ij} = \frac{e_{ij} / E_i}{e_j / E} = \frac{s_{ij}}{x_j}$$, where

- e_{ij} number of employees in area j in branch i,
- e_j the total number of employees in area j,

found that the statistical content of other two measures was very similar. We also found the other two measures strongly biased by the absolute differences between firms, branches and spatial units. Relative concentration is at the heart of the clustering process, and this requires relative measures. Comparisons that are based on the use of absolute values are therefore less applicable, since they reflect size biases.

Our calculations are new and more precise in two aspects. We could disaggregate our database in spatial terms from the NUTS 2 level (regions) to the NUTS 3 level (comitats)[10]. This is important because, on a regional level, important concentrations can be neglected due to differences in terms of varying significance levels of the different economic activities. But finer spatial focus also allows the observation of activity concentrations that do not follow the artificial boundaries of the regions. The other novelty of our calculation method was the use of various measures of economic activity, not just employment data. We used employment (number of employed persons), number of enterprises, value added and cumulated investment data (investments of the 1998-2005 period). Thus, the final product of the calculations was four measures for each traded cluster branch in each NUTS 3 level spatial unit for the year 2005, and three for the year 1998, since for the starting year no cumulated investment figure was available. The total number of calculation results was 740 (20 spatial units, 37 branches) for each of the four measures. For an easier overview and better analysis we followed the evaluation method found in Ketels and Sölvell (2005). We gave one point for all those branch-comitat pairs that belonged, in terms of the given measure, to the upper 15 % of the calculation values. Thus, every branch-comitat pair could get a maximum of 4 points (3 points in 1998)[11]. We considered those pairs where at least two measures proved to be significant (belonged to the highest 15 % and got therefore two points). We also calculated the Gini-coefficients. This measure helps us to determine whether activity concentration is caused by one or just a few large companies, or rather by a number of medium- or several small sized firms. This is a very important aspect, since we want to measure the pool of potential co-operators, and therefore, the

- E_i number of employees in branch i in the whole country (spatial unit of comparison),
- E total number of employees in the whole country (spatial unit of comparison),

Therefore,

- s_{ij} shows the share of area j in total employment of branch i,
- x_j shows the share of area j in total employment.

[10] The database allowed even deeper NUTS 4 level calculations.
[11] We also evaluated the branch-comitat pairs at a lower 30 % level.

actual size structure is highly relevant for us. The Gini-coefficient was calculated from employment figures. Values over 0.9 reflect a very uneven structure. If the number of firms (observations) is high (100 or more), then values as high as 0.7-0.8 already indicate that a number of medium sized firms should also be present. Thus, cooperative structures like clusters or supplier networks would have sufficiently broad pool to be based on.

We could spot significant concentration in at least one comitat, only in 22 of the 37 traded cluster branches for the year 2005. In the remaining 15 traded cluster branches, no branch-comitat pair received at least two points. The results are summarized in the next table. Interestingly, no services-centred cluster was captured by our calculations, although there is much anecdotal evidence on the existence of even formal cluster organizations based on various services activities (financial services, education, entertainment). Of course, it is possible that this failure is (be) related to the shortcomings of the measurement method. However, the absolute lack of indication in the whole country may also mean that either these clusters operate in an inappropriate environment (too few related companies), or they may be very young organizations that are not yet measurable statistically. In the case of the capital city, Budapest, a further option is also likely. This city is simply too big and has a too heterogeneous business activity that does not allow statistically outstanding concentrations. The large overall size limits the relative importance of sectors which would produce sufficiently large size in many aspects; still, the large denominator makes them unnoticed. Due to this measurement problem, Budapest and Pest County did not show significant concentrations at all. Since however, we could also provide the total number of firms in the given branch, high values of this data may still deliver the necessary information on spatial concentration.

Tabel 5. Hungarian cluster mapping

Sector	counties	number of firms	Gini-coefficient	qualification	note
Automotive	Győr, Komárom	29; 17	0,81; 0,77	yes	one center
Leather Products	Vas, Baranya, Szolnok, Szabolcs	6; 17; 6; 3	0,66; 0,65; 0,58; 0,66	?	two centers, spatially disperse
Footware	Vas, Baranya, Tolna, Bács-Kiskun, Szolnok, Szabolcs	10, 15; 15; 19; 14; 27	0,64; 0,70; 0,56; 0,54; 0,73; 0,67	?	two centers, few firms
Processed Food	Bács-Kiskun, Csongrád, Békés, Szabolcs	262, 135, 141, 201	0,78; 0,85; 0,79; 0,79	yes	two centers
Building Fixtures, Equipment and Services	Veszprém, Komárom, Nógrád	238; 319; 119	0,82; 0,76; 0,68	yes	one center
Furniture	Zala, Vas, Győr, Békés	170; 124; 186; 117	0,71; 0,78; 0,81; 0,73	yes	two centers
Metal Manufacturing	Fejér, Nógrád	179; 49	0,91; 0,75	yes	two centers
Motor Driven Products	Zala, Szolnok	62; 63	0,80; 0,86	yes	two centers
Biopharmaceuticals	Hajdu	6	0,82	?	one center, few

					firms
Communications Equipment	Nógrád, Heves, Szolnok	18; 30; 36	0,79; 0,89; 0,89	yes	one center
Aerospace	Heves	3	0,57	?	one center, few firms
Agricultural Products	Veszprém, Baranya, Bács-Kiskun, Borsod	61; 59; 141; 93	0,81; 0,73; 0,65; 0,76	?	three centers, dispersed activities
Plastics	Bács-Kiskun, Borsod	106; 74	0,78; 0,87	yes	two centers
Analytical Instruments	Pest	87	0,77	yes	one center
Medical Devices	Hajdu	57	0,83	yes	one center
Publishing and Printing	Komárom	16	0,73	?	one center dispersed activities
Apparel	Vas, Békés, Hajdu	40; 54; 115	0,76; 0,68; 0,89	yes	two centers
Spőorting, Recreational and Children Goods	Baranya, Nógrád	17; 6	0,61; 0,75	?	one center, few firms
Information Technology	Veszprém, Komárom, Baranya, Pest	13; 25; 23; 127	0,77; 0,91; 0,94; 0,92	?	quickly changing spatial location
Construction Materials	Veszprém, Békés	12; 10	0,84; 0,63	no	one center dispersed location
Chemical Products	Vas, Borsod	5; 18	0,70; 0,70	no	one center dispersed location
Lighting and Electrical Equipment	Tolna	6	0,62	no	dispersed location , few firms

Source: http://www.clusterobservatory.eu

As it can be seen in the table and also on the amended maps, in many cases we have included several comitats together to form a potential cluster. This idea stems from the logic that the spatial dispersion of clusters should not necessarily follow administrative boundaries. The lower spatial observation level (i.e. NUTS 3) allows us to better localize the potential spread of clusters in the neighbouring comitats. We treated the comitat-branch pair, which showed significant concentration on 15 % level as gravity centres and added to them those neighbouring comitats that showed concentration on at least 33 % level. In some branches we could identify 2, in some cases even 3 centres, the nucleus of potential cluster formations[12]. Such examples are presented on the amended cluster maps. The last two columns of the table provide an evaluation of the branch-comitat pairs concerning the likelihood that they may become real clusters. Whenever we made objections, these were included in the last column - too wide spatial dispersion, too few companies present being the usual objections.

15 concentrations were found to be strong enough to form clusters. In many cases, cluster organizations already work in these centres. In another 14 cases we put a question mark indicating that either strong concentration was not

[12] We must notice here again, that spatial concentration is just one important condition for cluster formation. Hence, even if we call the observed concentrations clusters or potential clusters, it does by no means mean that there is an actual cluster organization present. HBS documents, as well as the European Cluster Observatory also use the term „cluster" for spatial activity concentrations.

supported by a sufficiently high number of potential cooperating firms, or because the relatively strong counties were not in each other's close neighbourhood, that would have limited frequent personal contacts of cluster members, which would be also an important aspect of successful cluster operations. In a few cases we found that the original traded cluster categorization was not perfectly suitable to the Hungarian economy. For example, in the case of the branch "agricultural products", Porter's original category included all types of farm products, including crops, animal products, but also equipment repair and other services. This is highly relevant for large and complex American farms, but does not really apply to much smaller, more specialized Hungarian producers. In this case another categorization could have reflected more precisely those activities along which Hungarian agricultural producers could potentially cooperate.

Summing up the lessons of our cluster mapping exercise, we can draw some important conclusions. It is necessary to highlight that most spatial concentrations (potential clusters) are located in areas where similar industrial activity had been carried out before the transition. This means that, despite the tremendous structural changes of the two decades of transition, some basic characteristics of spatial and activity structure of the Hungarian economy remained in place. This is important evidence which supports an important aspect of the cluster-related literature, namely that there is strong path-dependency in economic development. Path dependency also means, however, that cluster policies can and should not be treated as means of a new "capitalist industrialization". The main aim of clustering is to further develop traditional regional strength in order to gain regional competitiveness. We do not want to deny the possibility of creating new structures on the long run. Actually, in the case of the automotive industry and ICT production, development in Hungary by far exceeded previous levels. In these cases the existing capacities and expertise played a relatively little role. However, these cases seem to be more the exception than the rule.

Another interesting result of the survey follows from the previous argument. We found ample evidence on the existence of activity concentrations in branches and regions which have a strong FIE influence, like the automotive and ICT sectors. There is a lot of empirical evidence that shows the impact of important supplier networks[13]. Strengthening the clustering process in such vertically integrated networks would require support for horizontal linkages among cluster members. However, we also found branches where the FIE involvement was much weaker. We can conclude therefore, that cluster development in such regions and branches where there is no FIE dominance is also possible. But the structure and functions of these clusters may be very

[13] For the car industry and the role of PANAC, the Hungarian automotive cluster see: Grosz, 2006.

different. They have stronger horizontal cooperation and less vertical. Also, the power relations are different in such clusters[14]. In this second type of clusters, the main activity is rather small business and regional development. This variation of cluster types calls for more refined and not uniform solutions in the cluster development policy.

5. Conclusions

The concept of industrial clusters is different and, most importantly, broader than that of multinational firms' supplier networks. The latter can form the nucleus of a potential cluster, but this is the case only if certain conditions, most importantly, horizontal linkages as well as a heterogeneous structure of collaborating actors are provided.

The spatial concentration of supplier networks around multinational companies is reflected in the cluster mapping exercise. Therefore, one of the most important preconditions for forming a cluster, achieving the critical mass, is usually given in the vicinity of the largest investments. Foreign firms, however, are neutral at best concerning the organization of networks among suppliers. Their primary interest is organizing the supply chains' smooth cooperation.

Foreign companies can be made interested in contributing to the work carried out within clusters. They might be interested in the cluster activity of improving regional labour force supply, enhancing suppliers' technical capabilities. They are, of course, also interested in fiscal incentives. The cluster literature lays great emphasis on the big firms' essential role in successful cluster operations.

Clusters may evolve, however, without the participation of foreign multinationals. In certain industries and markets, SMEs enjoy substantial advantages and big firms are not strong. Clusters are not reserved for technology intensive manufacturing activities (where multinationals are strong). Cluster organizations may be valuable drivers of regional economic development based on more traditional activities. An important aspect of such clusters is path dependency: traditional local competitive advantages are at their bottom.

Despite the role of path dependency, structural changes that the new techno-economic paradigm carries provide opportunities for emerging market economies to take new roles in international labour division. This relates mainly to the most globalized industries and services, where global sourcing has produced massive relocations in the recent past. Nevertheless, neither multinational firms' penetration in emerging market economies, nor cluster development can be treated as a tool of "capitalist industrialization".

[14] For evidence and case studies see: Szanyi 2008.

Development (industrial) policy shall continue to focus on improving economic conditions and the sources of future growth and prosperity.

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