

Clusters and the development of supplier networks for transnational companies

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Clusters are regarded as an important tool of providing matching answers to challenges from transnational companies. Clusters are regional concentrations of firms, research and education institutions, regional development bodies and other participants that share some joint technological platform and aim to increase their joint competitive strength via collaboration at different levels of corporate activity. Transnational companies themselves may get involved in clusters in various countries, e.g. thru their affiliates in some host economies. One form of the clusters may be collaboration of transnational companies and their partners and suppliers. The paper analyzes the main characteristics of clusters and the rationale of their functioning. Then transnational firms' inclination for supplier network development is considered. Also, the study describes the activities and levels of cooperation among transnational companies (most importantly OEMs) and local suppliers. Based on the analysis of supplier network patterns the paper then compares this cooperation content with typical activities carried out in successful clusters. The study mainly deals with Hungarian experiences, though most of these may also be relevant for other transition economies. The main finding of the paper is that transnational companies' primary interest lies elsewhere and not in cluster development. However, if there is strong local initiative and professional cluster management they may be made interested in certain types of cluster activity.

Keywords: cluster, regional development, transnational company, economic policy

1. Cluster concept and definitions

Spatial concentration and specialization of economic activities has been recognized and analyzed for over hundred years. Alfred Marshall (1890) studied determinants of industrial agglomerations and found three decisive factors: access to developed labor market, to deep supplier background and possibility of quick knowledge and information transfer among firms. More recent publications have similar arguments (Krugman 1995, Venables 2001).

The main rationale of spatial concentration is achieving agglomeration economies. A distinction was made among different types of agglomeration economies (i.e. various kinds of rationale of agglomeration process). One type relates to general economies of regional and urban concentration that apply to all firms and industries in a single location (urbanization economies), representing those external economies enjoyed by firms as a result of saving from the large-scale operations of the agglomeration as a whole. These are the forces leading to the emergence of industrial core regions and metropolitan regions. A second type is the more specific economies that relate to firms engaged in similar or inter-linked activities that lead to the emergence of industrial districts (localization economies). Such districts provide the base for flexible production systems that can serve volatile markets. In both cases agglomeration economies are rooted in functioning processes where linkages among firms, institutions and infrastructure of a given location give rise to economies of scale and scope. For example, the development of general labor markets and pools of specialized skills, dense interactions between local suppliers and customers, shared infrastructure and other localized externalities. Agglomeration economies arise when such links lower the costs and increase the returns of the firms taking part in the local exchange. Presence in agglomerations improves performance by reducing the costs of transactions for both tangibles and intangibles.

The emergence of the cluster concept is bound to Michael Porter's seminal work (Porter, 1990, 1998, 2003). 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 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 has 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. Pouder and St. John (1996) and Saxenian (1994) emphasized the importance of social networks in the functioning of clusters. Trust-based relationships and social capital may thus be important for enabling horizontal cooperation between individuals within and across firms and institutions. In this context clusters are not solely fixed flows of goods and services or production inputs, but rather dynamic arrangements based on knowledge generation and innovation in a broad sense. Innovation, knowledge generation and transfer have become primary explanatory factors of the new agglomeration types, the dynamic clusters.

Clusters may bring new types of benefits for their participants as compared with agglomerations. These originate in joint activity and cooperation. Scale and scope economies of agglomerations may also be enjoyed by cluster members, but they are completed by synergies of cooperation. Thus, clusters are made up not only of physical flows of inputs and outputs, but also by intensive exchange of business information, know-how, and technological expertise both in traded and non-traded forms.

Clusters are defined in many different ways by various authors (e.g. EC 2003; ICEG 2006; Clement and Welbich-Macek 2007; Europe Cluster Observatory, 2007). This is the result of Porter's very loose original definition that interpretations wish to concretize. Porter's original definition was the following: "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, p. 199)

As is seen, four elements are crucial: geographic concentration, specialization, alliance among heterogeneous market agents, institutions and the co-existence of competition and cooperation among them. We think that all these four elements of the definition are crucial, since they express the complex links of clusters with Porter's overall competitiveness concept. On the other hand, adding new characteristics to the definition usually limits the scope of clusters to one or another potential area. This new emphasis usually reflects actual policy goals that institutions or governments wish to support by clusters. One of the most current emphasis of European Union's policies is innovation. Support of innovative clusters appears in the 2007-2014 budget. Clusters are usually innovative in the broad sense of the word. Innovations are the main outputs of the synergies of cluster cooperation. However, there is a danger that government policies misinterpret the innovative cluster phenomenon, and would spare clustering for branches that are regarded innovative (high tech). There is another important threat of misinterpretation. Too much emphasis on innovation in cluster activities would reduce attention towards crucial basic cooperation functions of clusters that are vital also for

establishing solid background of innovative co-operations. Hence, narrowing down of the original cluster idea may effectively block important cluster functions.

2. What are clusters, what are their specific marks?

In this section we review some of the main elements of clusters commonly found in both the theoretical and empirical literature. These features need not be present in all clusters neither should they be pushed for by policies. They rather illustrate the most common features of modern co-locations of firms called clusters. Cluster organizations' tasks and activity are determined by these features.

2.1. Spatial concentration

Spatial concentration has been central to the cluster idea from the outset. Even though some approaches have tried to disprove or query the importance of physical agglomeration, there are many aspects that remain at the core of the cluster concept. Venables (2001) proved that the "death of distance", i.e. the extensive use of modern ICT technologies and other technological achievements do not necessarily weaken agglomeration effects. The impact is rather mixed: some effects are weakened, but many others became stronger. Hence, the structure of balance of centrifugal and centripetal forces in agglomerations probably changed, and so did the structure and functions of agglomerations. But agglomerations and clusters remained strong features of regional development.

The hard facts underpinning the importance of geographical concentration, which we described in the previous section, remained largely unchanged since the seminal works of Marshall (1890), though their weight and importance changed over time. Economies of scale and scope achieved by sharing infrastructure and information, as well as by the proximity of suppliers, factor markets and demanding customers continue reducing transaction costs of arms length business. For these reasons firms may experience that their belonging to a set of inter-related actors which can in the given region enhance efficiency, supports productivity growth, raises innovativeness, especially due to better access to knowledge, ideas and skills. From this set of potential advantages access to specialized factor markets deserves special attention. It enables companies concentrating on their core competencies and allows outsourcing auxiliary activities to specialized suppliers. Increased flexibility is achieved through the use of cooperating production networks, which is in most cases based on a dense population of firms with inter-related activities. Networks operating within clusters may enhance cooperation on various other issues as diverse as training, finance, technological development, product design, marketing, export or distribution.

2.2. Specialization

Clusters are usually viewed as organizations or networks of participating actors linked together via a kind of core activity, which provides clear emphasis on the same markets and processes. Traditional clusters showed strong sectoral specialization patterns. Various studies have found however, that many clusters have limited transactions among firms within the cluster, e.g. in the form of buyer-supplier contacts. The attention has gradually shifted to the significance of knowledge spillovers and to the dynamic clusters. While Porter was mainly

concerned with the existence and reproduction of clusters with technologically related firms, latest attempts are targeted at the analysis of learning abilities and creativity of spatial agglomerations. Instead of specialization and spatial clustering of related industries, emphasis is placed on the presence of a regional variety of skills and competencies, where the interaction among different actors leads to new and often unexpected ideas. The concept of the dynamic clusters was elaborated and introduced by Solvell et. al. (2003). This concept is very much in line with current developments of the production factors engaging technology and skills intensively with the increasing knowledge content of traded goods, and services becoming more pervasive.

Specialization in dynamic clusters is primarily not expressed in co-location of business entities of a given sector and their dense business contacts. Their specialization is not viewed as necessarily limited to a given product or industry category. The dynamic cluster may go beyond relations within a specific sector and its value-chain. Clustering across traditional sectoral boundaries can be an important source of innovation and competitiveness. However, effective clustering still needs a strong element of complementary specialization between actors, a common denominator. Actors focusing on core business can couple at these common denominator useful linkages, important synergies in a learning process engaging various organizations. Examples of such inter-sectoral specialization areas are telematics, biotechnology and many other technology areas utilizing interdisciplinary approach in their innovation process. The emphasis on the outstanding role of knowledge generation, innovation and information exchange in dynamic clusters in contrast with traditional clusters means that this is one of their most important functions. Information sharing and innovation also occur in traditional clusters but their most important function is enhancing regular trading contacts and production via various economies of scale and scope.

2.3. Cluster actors

Essential to clusters is pluralism. Successful clusters constitute of various kinds of actors, not just firms. In the absence of such pluralism an agglomeration is no more than an enlarged enterprise (a network of companies in which one has the prime role). In such conditions smaller companies may merely serve as subcontractors or clients of the main entity. This distinction is not trivial at all. There is strong motivation to reduce transaction costs and friction between separate firms via concentrating activities in single firms and in strongly dependent supplier network. Today however, costs of administration, management and control, risk management, and search for sources of flexibility favor stronger focus on core business of single organization and the formation of continuous relations and learning processes between separate entities. Recent cluster mappings (e.g. Commission, 2003) report that most clusters comprise mainly of a fairly large number of SMEs. Clusters may also encompass intensive links and alliances with various institutions like universities, research institutes, public authorities, consumer organizations, think tanks, and others. Solvell et. al. (2003) argue that four main categories of actors are vital and normally present in clusters: companies, governments, the research community and financial institutions. Of importance for cluster initiatives are also the so called Institutions for Collaboration (IFCs), defined as formal or informal actors to promote interest in the cluster initiative among the actors involved. The role of IFCs may vary substantially. They may promote cluster initiatives (i.e. top-down development of cluster cooperation), and perform a series of cluster actions.

2.4. Competition and cooperation in clusters

Connections between cluster actors are characterized by simultaneous competition and cooperation. Competition remains important element of the market also in clusters. It delivers important drivers for improving corporate performance: reduce prices, increase quality, reliability, search for new products and markets, boost innovations. Clusters are not about reducing the importance and extent of competition. Clusters should not serve as an elite club thus trying to ensure privileges for incumbents either, but they should be open for new entries. Open entry may also provide new impetus a source of new technologies and knowledge for incumbents.

At the same time actors in a cluster may cooperate around a core activity using their competencies to complement each other. When operating in tandem firms may also be able to attract fresh resources and services that would not be available to isolated participants. By pooling resources and risks and by developing complementary functions firms achieve economies of scale and scope. Central to the quality of cluster operation in terms of information exchange and knowledge flows is trust and recognition. In this sense trust is about sharing a vision and belief in mutually fruitful relations. Building trust means people enabling other people to believe in their mutual long-term benefit. This may be demanding at first contact, especially when new actors enter new markets.

While proximity matters for informal knowledge flows, global linkages are equally essential. Transnational enterprises are primary sources of skill and knowledge transfer, and have been decisive for the development of many local clusters. Many clusters have vivid contacts to actors outside of the region. This is further reinforced by globalization and by the post-Fordist disintegration of the production systems. The internal knowledge pool of firms is complemented by distributed knowledge base in their whole value chains, where much knowledge enters outside the cluster in form of new machinery, intermediate inputs or simply ordering specifications. Thus, there may be an extensive interface between cluster firms and their outside environment.

2.5. Critical mass

Inner dynamics can be achieved only if numerous actors participate in the cluster. The critical mass is necessary for the realization of various scale and scope economies. Multiple interactions are conditional for these, and so are variety of possible combinations, sufficient pool for choice, as well as learning by doing. The presence of critical mass may also support industrial restructuring in a cluster, fostering linkages and complementarities between flexible SMEs and larger corporations. Critical mass may serve as a kind of buffer and make cluster resistant to exogenous shocks and pressures, including the loss of important companies, even if they were regarded as key companies. The absence of critical mass can in turn make a region or a cluster vulnerable to the loss of specific resources and skills, which are essential building blocks of cluster development. Due to path dependence hot spots of economic development are also likely to be in places, where there is a critical accumulation of assets and skills today. Of course, there is no precise description what should be the sufficient level of critical mass, not even the exact measures are applicable.

2.6. Cluster life cycle

A further important element of the cluster is the mode of organization, the way how actors are linked together. Cluster organization usually undergoes changes during the different periods of cluster life cycle. Clusters are not temporary solutions for acute problems, but have a sense of direction and inner stability over time. However, their structure is not rigid or static, and experience shows that they have development stages. The stages may not be identical, neither is the pace of development similar. Still, there is an inherent logic to the way how clusters develop, which makes it possible to find some characteristic patterns.

The first stage (or pre-cluster stage) is the simple co-location of various market actors with potential albeit not institutionalized cooperation activities. Second stage is the emerging cluster, in which a number of actors of the agglomeration start to cooperate around a core activity realizing common opportunities through their linkages. The third stage developing cluster attracts new entrants through the positive experiences of collaborating. They may be engaged in the same or related to the core activities, and present in the geographical vicinity of the developing cluster. Formal or informal IFCs may start their activity as organizers of cluster activity. The outside appearance of the cluster becomes established in the form of a label, website, etc. The mature cluster has reached the critical mass for long term stable existence. It has also developed relations outside the cluster to other clusters, activities and regions. There is an internal dynamic of new firm creation through start-ups, joint ventures, spin-offs. The mature cluster is transformed into new cluster organizations in the last phase. As time goes by, markets, technologies and processes change thus, the core competencies of firms and that of clusters also change. In order for a cluster to survive, be sustainable and avoid stagnation, it has to innovate and adapt to the changes. This can mean transformation into one or several new clusters that focus around new core activities (SRI International 2001).

2.7. Cluster activities

Clusters may vary in many aspects. They may evolve in organic bottom-up ways or initiated by development institutions, their sectoral focus may range from agriculture through manufacturing to high value added services, they may be supported by IFC or serve as a branch of a regional development agency. These differences influence the actual organization structure, the main aims and strategic goals of the cluster, and also the actual activities carried out. However, there are four main areas and types of activities that are generally pursued by any clusters. These are social capital development, the development of strategic linkages, creation of vision and strategy and concrete actions.

Social capital is one of the most important framework conditions of functioning clusters. The first step is therefore preparing the ground for the cluster initiative. The communication process is launched by establishing awareness of potential mutual benefits from clustering among key actors. Open communication and transparency between key actors is crucial as it is essential for building trust. Cluster initiatives may particularly be required to nurture trust by broadening the scope of information sharing and the establishment of advanced knowledge networks. In successful clusters the task of nurturing trust typically succeeds in broadening the number of committed actors and keeping the cluster open, outward oriented. This way the contribution of the group far exceeds that of individual firms. Also, the cluster may achieve critical mass by incorporating new entrants. Difficulties in launching the cluster initiative may be substantial, as the risks and costs that firms have to count with when participating may often be perceived as impossible to surmount. On this ground particularly SMEs may hesitate to spend time and effort on a network with vaguely defined objectives. They may also fear of

losing strategic assets and other information to other cluster members, especially large firms. Hence, they may wish to start with less strategic alliances before entering more complicated cooperation tasks.

The initial step in this phase is formalization of existing linkages. This is the point where most cluster initiatives are launched; they belong to the network of formalized linkages through the establishment of an IFC. Structured routines for interactions are formulated, and cluster vision and strategy developed. This process is supported in many cases by competence audit, a kind of mapping the competitive advantages of the region and the competencies of the participating actors, and determining the gaps that exist. A visualized form of the audit results is the competence matrix that expresses core competencies and stimulates the creation of local linkages among firms, universities, research institutions and related industries with the aim of spurring local economic growth. It serves as a guide for potential partners to more quickly identify cooperation possibilities for various corporate functions. The matrix can be also used by individual firms as a kind of reference and sales argument that illustrates their extended cooperation network. Preparation of the competence system matrix is especially useful for newly funded clusters, where there is no sufficient information on the individual actors.

Cluster initiatives may wish to develop a shared vision, common goals and strategy for their achievement. A detailed regional analysis can help structure the starting point of collaboration. Usually, goals of cluster development as well as the baseline for possible future evaluation are put in place at this stage as well. IFCs will have more sense of direction if the appropriate coverage and scope for the evaluation process is defined. A primary goal of the cluster initiative to be viable on long run is becoming self-sustainable at one stage of development. When the key competencies are clear strategic analysis is prepared that estimates the current situation and projects possible future developments. Among the many proven heuristic and statistical methods that can be used in this work foresight exercises became most popular in recent past, which usually involves knowledgeable agents and key stakeholders. This method is valuable because it gathers important knowledge and reflects on the insights and special interests of the cluster participants who will be critically engaged in its interactions. Bringing together decision makers at the outset of cluster development may be beneficial also because it can also facilitate commitment and engagement among the actors involved. As clusters should continuously redefine their visions and strategies in order to stay innovative, goals and action plans will also require adjustments. Hence, strategic planning and implementation is an iterative and inter-related process.

When vision and strategy has been defined, implementation of tasks may start. This requires a set of cluster actions according to the pre-defined action plan. The actions are applied in order to strengthen the cluster initiative and to improve the surrounding competitive environment. The next table lists a few of the most commonly undertaken cluster actions.

Typical cluster actions

Improve cluster dynamics			Improve cluster environment	
New technology and firm growth	Inter-actor network creation	Cluster formation	Factor markets	Cluster basis

<p><i>New technology:</i></p> <ul style="list-style-type: none"> - Organize seminars, meetings, workshops to facilitate technology diffusion in the cluster - Establish centers to develop and test new production technologies - Create observatory of technical trends <p><i>Firm Growth</i></p> <ul style="list-style-type: none"> - Support cluster-based incubators - Encourage entrepreneur networks - Provide business assistance - Launch marketing and image campaigns to attract new firms - Improve FDI incentives - Improve financing conditions for spin-offs through regulatory changes or the set-up of special financing mechanisms or investment funds 	<p><i>Networking</i></p> <ul style="list-style-type: none"> - Form cross-agency cluster teams - Foster firm networks - Foster the sharing of personal networks - Facilitate external connections <p><i>Commercial cooperation</i></p> <ul style="list-style-type: none"> - Form export networks - Compile market intelligence - Coordinate purchasing - Establish technical standards <p><i>Joint R&D projects</i></p>	<p><i>Cluster analysis</i></p> <ul style="list-style-type: none"> - Conduct a competence audit - Undertake a strategic study and analysis - Model and amplify systemic relationships - Conduct benchmarking analysis - Organize and disseminate information in the cluster <p><i>Actions for engagement and service delivery</i></p> <ul style="list-style-type: none"> - Create or formalize IFC and communication channels - Improve firms' cluster awareness - Facilitate interaction between different areas of government and cluster actors <p><i>Cluster marketing</i></p> <ul style="list-style-type: none"> - Create brand for region - Actively promote cluster - Target inward investment 	<p><i>Specialized labor supply</i></p> <ul style="list-style-type: none"> - Provide management and technical training - Use clusters as context for learning - Establish cluster skill centers - Attract talent to region <p><i>Specialized capital markets</i></p> <ul style="list-style-type: none"> - Prioritize investments in cluster projects - Give incentives or set aside funds for multi-firm projects - Promote joint financing, the creation of special investment funds, or the provision of credit guarantees - Encourage sharing of risk across cluster actors - Improve access to and usage of natural resources 	<p><i>Legal framework</i></p> <ul style="list-style-type: none"> - Improve framework conditions - Evaluate competition policy <p><i>Infrastructure</i></p> <ul style="list-style-type: none"> - Develop new or improve existing infrastructure through joint actions and new financing models - Conduct private infrastructure projects <p><i>Social capital</i></p> <ul style="list-style-type: none"> - Foster the expansion of personal networks - Foster inter-firm communications and networks <p><i>S&T and R&D framework</i></p> <ul style="list-style-type: none"> - Support mutual realization or financing of research and development projects
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Source: Andersson et al. 2004

Cluster actors' objectives when joining the cluster initiative maybe different sometimes even contradictory. Objectives of the major types of actors will be by definition diverse. Firms might be motivated by the possible access to complementary skills of other firms, regional policy makers and institution are interested in local growth and prosperity, meanwhile a politician may seek for reputation in order to gain additional votes. Some of the objectives are directly related to economic return, but social esteem and personal rewards also matter. It is not easy to find a sufficiently concrete common denominator of the various ambitions. It is not sufficient to share such common goals and objectives like improving the foundations for economic activity (cluster environment) or improving conditions of the cluster (cluster dynamics). For the strength and dynamics of the cluster for the longer run, however, all participants need to experience an acceptable risk-return ratio. This is particularly important for innovative clusters, where risks of innovation and technological development are immanently high and markets change quickly.

3. Factors affecting the share of local supplies

Linkages with affiliates of TNCs operating in Hungary can form a good basis for deeper relationships between domestic companies and companies with foreign participation, including a formation of a cluster, as a few cases prove that in Hungary. Various factors determine the share of local (backward) linkages of companies with foreign participation. In this section, concentrating on backward linkages and on manufacturing companies, we list those factors which influence the inclination of companies with foreign participation in their use of local suppliers. (Sass, Szanyi, 2004) Moreover, based on available empirical evidence, we show how these factors affect the share of local suppliers in Hungary, which remained below the expectations up till now.

3.1. The mode of FDI entry

There are differences in local value added and use of local suppliers, according to the type of investment. (See e.g. Sass, 1997 for Hungarian companies, based on a results of a questionnaire survey or Szanyi, 2001.) Understandably, some of the privatised companies retained their original domestic suppliers after restructuring, particularly if their main focus was on the domestic market. In Hungary, in the case of Tungsram (General Electric's acquisition of Tungsram producing electric bulbs), the share of local suppliers is over 40 per cent, or in the case of Siemens (which acquired the Hungarian Telephone company in the framework of privatisation) the corresponding share is 35 %. For Electrolux (which bought the Lehel factory in the white goods sector), for certain products, the share of local supplies reaches 80 per cent. The targets of these privatisation transactions were Hungarian companies with a relative success, with a long history and tradition and intense cooperation in the field of production and/or trade with foreign partners prior to privatisation. The specificities of the activity carried out in these companies made it possible for other Hungarian companies to maintain supplier relationship or to join in the supplier network of the company in question. Other companies in the group are ZF Hungaria Ltd, Knorr-Bremse Ltd, ABB Ltd and Raba (current names of the companies).

Table 1 Share of local suppliers in privatised companies

Company	Sector	Share of local (Hungarian) suppliers from local value added
ABB Ltd.	Energetics machinery production	45 %
Adtranz Ltd.	Diesel trains, freight trains production	55 %
BPW-Raba	Truck undercarriage production	35 %
Electrolux Lehel Ltd.	White goods production	40 %
GE Lighting Tungsram	Light source production	50 %
Knorr-Bremse Ltd.	Brake structures production	30 %

SVT-Wamsler	Consumer electronics goods production	55 %
ZF Hungaria Ltd.	Gearbox production	35 %

Source: Ipargazdasagi Kft. (2002A)

On the other hand, in the case of greenfield investments, it can take a considerable time to build up a local network of suppliers. Many of the greenfield investors have a limited number of local suppliers, but in most cases, there has been an increase as the company became established over time. Examples include Audi, Felxtronics, LuK Savaria, Nokia, Samsung, Temic, Visteon. For example, in the case of Audi (automotive industry), from less than 1 per cent to 10 per cent by now (including the effect of the establishment of an R&D centre). Moreover, in the case of greenfield investments in the same sector as Tungsram (DL) by Philips, Nokia and Sony, each deploy local suppliers in a less than 10 per cent share. Given the relatively long greenfield FDI history of Hungary, by now, there is evidence in the Hungarian economy on new networks created by greenfield investors. (Barta, 2002, Szanyi, 2002) There is also evidence of agglomeration effects and clusters being formed in the Northern Transdanubia and Budapest agglomeration. (Buzas, 2000; Grosz, 2000; Barta, 2002) They are formed around companies with foreign participation, mainly greenfield investments. These networks are part of the international networks of TNCs, and are concentrated geographically in the part of the country containing the majority of FDI. These networks consist mostly of companies with foreign participation, the majority of them established through greenfield investments.

Table 2 Share of local supplies for greenfield investments in Hungary

Company	Sector	Share of local (Hungarian) suppliers from local value added
Denso Ltd.	Diesel feeder pump production	0 %
IBM Storage Ltd.*	Hard disc drive production	Below 5 %
LEAR Ltd.	Production of inner structures of vehicles	10 %
Opel Hungary Ltd.	Engine, cylinder head and gearbox production	Below 5 %
Philips-group	Electronics goods production	10 %
Phycomp Ltd.	Assembly of condenser and	0 %
Sony Hungaria Ltd.	Electronics goods production	Below 5 %
Thyssen Production System Ltd.	Production of automotive goods	0 %

Tower Automotive Ltd.	Assembly of parts of bodywork	0 %
Zeuna Starker Ltd.	Production of structures of exhaust pipes	15 %
Zollner Elektronik Ltd.	Electronics parts production	6 %

* production relocated to China in 2002

Source: Ipargazdasagi Kft. (2002A)

3.2.Sectoral differences

Sectoral composition of FDI also has an impact on the extent of using local suppliers. There are some sectors with a greater tendency to involve less local suppliers. (UNCTAD, 2001) Inside manufacturing, subsectors of the machinery industry, especially the automotive and electronics sectors are of that type. Among others, the subtle production networks set up in these sectors form a certain entry barrier for suppliers, which can be explained by the specificities of the product, of the technology, and for export-oriented investors the high quality requirements. At the other extreme, foreign affiliates in the food industry, or in the production of building materials given the relatively closed market and a small relevant market, and/or relatively high transport costs rely to a great extent on local supplies. However, it is important to assess the „supply capacity” of the various sectors as well: for example the rubber, plastic and metal producing sectors are able to provide spare parts or components to a number of machinery subsectors (electronics, automotive, general machinery production), as it is the case in Hungary as well.

Differs in the various sectors using local supplies, the structure of supplier „pyramids”. (Ipargazdasagi Kft., 2002A) In Hungary, inside the machinery industry, in the automotive and electronics sectors, TNCs, carrying out end-assembly or producing complete main components and positioned at the top of the pyramid, are present, (e.g. Audi, Suzuki, Philips, Nokia, Ericsson); together with first-supplier TNCs (e.g. LuK, VAW, Visteon, Leoni, Flextronics, Temic, Elcoteq). Moreover, numerous second and third suppliers also invested in Hungary. Thus, supplier pyramids have also been formed in the country. However, the intensity of links varies according to the level inside the pyramid. Hungarian suppliers usually join the second, third or further levels of the pyramids, having little direct contacts with the top company and the first supplier.

The character of the activity carried out at the TNC local affiliate is related to its sector, not independently of technological characteristics of the branch. Large assembly plants may base their activity solely on imported subassemblies. In this case the share of local value added in output is usually very low and import ratio is extremely high. Assembly lines of this kind are located mainly in the electronics industry, and in some other engineering branches. The local contribution is mainly produced by unskilled labour employed on the assembly plant. Chances of supplies by other local companies are rather meagre, since the aim of the activity is to tap cheap unskilled labour. Local deliveries do not exceed the area of facility management, catering, cleaning and guarding (all activities belonging to the service sector). These activities are of course not essential from the viewpoint of the main product, and do not provide those desired positive external effects that improve local companies technological, managerial or marketing capabilities or their productivity and efficiency.

3.3.Export-oriented versus domestic market oriented investors

The main motive of investments also matters from the point of view of the extent to which domestic suppliers can be “involved” in the production of foreign owned companies. This factor is related to the sector of investment and to the mode of FDI entry as well. Big, export oriented greenfield projects are usually less integrated in the local economy, than their domestic oriented counterparts. Reuben et al. (1973) show for developing countries (among others) that local-market-oriented affiliates deploy more local suppliers than export-oriented affiliates. The group of large, export-oriented projects in Hungary can be easily separated from other companies (Antaloczy, Sass, 2003), because in the companies in question, the share of exports is usually close to 100 per cent and they are among the top Hungarian exporters (see Table 3). In this group, we can find investments by Audi, Flextronics, Philips, IBM, Suzuki, Samsung, to name only the biggest ones. These greenfield, export-oriented big projects had a maximum 10 per cent share of local suppliers (including both “purely” domestic and foreign owned domestic). The above mentioned companies represent almost one-fifth of total Hungarian exports¹. In a questionnaire survey carried out among Hungarian companies (Sass, 2007), companies could also be categorised into the local market oriented and export oriented group. For the export oriented group, the share of local supplies was between 20 and 30 per cent, though increasing over time. In the domestic market oriented group, companies sourced around 60-70 per cent of their inputs locally.

Table The top ten Hungarian exporters, 2005

	Company	With foreign share?	Sector	Share in total Hungarian exports (%)	Export/sales (%)
1.	MOL	(yes) (stock exchange)	Energy	9.6	47.9
2.	Audi	Yes (greenfield)	Automotive	8.6	99.8
3.	GE Hungary	Yes (privatised)	Electronics	4.4	98.0
4.	Philips	Yes (greenfield)	Electronics	3.5	93.6
5.	Flextronics	Yes (greenfield)	Electronics	2.9	97.3
6.	IBM DSS	Yes (greenfield)	Electronics	1.8	99.9
7.	Magyar Suzuki	Yes (greenfield)	Automotive	1.8	72.1
8.	Alcoa-Kofem	Yes (privatised)	Metal working	1.5	94.1

¹ Nokia, which does not publish data on its activities in Hungary, has a similarly high export intensity and an estimated close to ten per cent share in Hungarian exports, thus, together with the companies in the table, it represent close to one-third of Hungarian exports.

9.	Samsung	Yes (greenfield)	Electronics	1.3	77.6
10.	Michelin	Yes (privatised)	Automotive (tyres)	1.2	89.5

Source: Based on data published by HVG (Hungarian economic weekly)

3.4. Differences between the performance of the “domestic” and “foreign” sectors

If the foreign sector is differing to a great extent from the domestic one, it may affect negatively the formation of linkages between the two segments of the economy. (Hunya (2001) In an environment, where the two groups of companies form separate segments inside an economy, the evolution of forward and backward linkages may be hindered. However, as companies with foreign participation become more established over time and more familiar with the functioning of the economy and the performance of domestic companies improves, the importance of this factor may whither.

In Hungary, the two sectors differ considerably from each other. Many studies found, that the most important differentiating factor among Hungarian groups of companies is their ownership (and not unrelated, their size). Companies with foreign participation perform better in all fields of company performance, like profitability, competitiveness, export etc. than their domestic counterparts. Labour productivity is significantly lower in domestic companies. Empirical evidence is inconclusive on the narrowing of the difference between the performances of the two groups of companies, which would give an impetus to forming more linkages between them.

3.5. The age of the investment

Foreign owned companies tend to increase the share of local inputs over time. (Blomstrom, Kokko, 1997) Even in the case of greenfield investments, and export-oriented investments, a gradual build-up of local supplies can be observed, even if the share of these remains relatively low. Anecdotal evidence on companies with foreign participation underline the importance of that factor. Certain greenfield companies could increase their local supplier base considerably since their establishment. For example, the share of local supplies was below one per cent for the Hungarian Audi affiliate in 1997, which has been increased to 10 per cent by now. The already cited questionnaire survey (Sass, 2007) showed, that there is an few percentage point increase in the average share of local supplies in Hungary between 1998 and 2004.

3.6. The quality of (potential) local suppliers

Chances of establishing and the quality of supplier linkages also depend on the size and quality of local business. One major characteristic feature of Hungarian business is the lack of medium-sized companies, suitable technically and financially to supply the large scale batches at the desired technological accuracy and reliability and timing (See: Szanyi, 2002b). Due to the privatisation practice that preferred foreign investment, many of the better performing medium-sized companies became foreign owned. Most of the remaining firms

was weak from many aspects (products, markets, finances, management) and went bankrupt due to these weaknesses. Unlike in other transition economies, the Hungarian state did not make serious efforts at bailing out. As a result, only a few dozens of the surviving medium-sized manufacturing companies remained and were acquired by Hungarian capital owners. They have the biggest chances to become suppliers, because they can keep up with the quantity and quality requirements of foreign owned companies. According to Ipargazdasag Kft. (2002B), only 7 per cent of Hungarian suppliers is a medium sized company.

The missing layer of medium sized companies has a hindering impact on the building up of Hungarian networks of suppliers in another respect. The number of the so-called medium and big sized indigenous integrator companies is also relatively small, compared to other countries in the region, applying different privatisation techniques (e.g. the Czech Republic). In the “surroundings” of Suzuki, there are a few of these types of companies (e.g. Bakony Művek or Imag), or Videoton² acts as a contract manufacturer for car producers or in the electronics industry but for other affiliates, the role of integrator companies is played by partly or wholly foreign owned companies, which results in a smaller network of local suppliers and/or more limited spillovers.

The many small ventures that were established on the ruins of the bankrupted large and medium-sized companies are still too weak and unprepared technologically and also financially, to become suppliers. Thus, from the local firms’ side it is the lack of good quality potential suppliers that hinders the development of local supplier linkages of TNCs. Instead, in many cases, it is either privatised through FDI medium sized companies, or traditional first-tier suppliers of TNCs settled in Hungary, who deliver the overwhelming majority of locally acquired supplies of large multinationals³. The role of Hungarian companies is in many cases limited to supplying first or second tier suppliers of the affiliates with spare parts or to assembling, and they are not able to develop their own products. For this latter, both the financial and human resources are missing.

According to Ipargazdasagi Kft. (2002A) many Hungarian suppliers have many customers; they supply electronics and automotive companies as well, using the specificities of their plastic or metal products, which can be used for many different end products. Hungarian suppliers can be characterised by smaller series (in some cases one-off products, specifically produced for the buyer), labour intensity and lower complexity, compared to production carried out in affiliates of TNCs. It is not only the quality, but also the quantity of local supplies, which domestic (potential) suppliers can not produce. This also acts as a hurdle for a Hungarian company to become supplier for an affiliate of a TNC.

There is a further requirement for suppliers: the stability dimension. That is why suppliers are required to supply more than one affiliate. For example, Audi and other automotive companies require their suppliers not to exceed revenues from one company 30 per cent of total revenues. (Gelei, Nagy, 2005, 16.o.) For many domestic companies, this requirement can not be fulfilled due to a shortage of labour, financial means, skills etc.

² Videoton is a contract manufacturer of ABB, Philips, Sony, Matsushita/Panasonic, Kenwood, AFL among others.

³ According to data provided by HVG (Hungarian economic weekly), in 2001, ten of the biggest automotive suppliers were present in Hungary with significant production capacities. The presence and growing production of big carmakers (Audi, Suzuki, Opel/GM and Ford/Visteon) in Hungary acted as an attracting factor for their traditional suppliers to follow them and establish a production capacity in Hungary..

3.7.The impact of the nationality of the investor

In that respect, one can distinguish the “local supplier strategy” of outside-EU export-oriented (greenfield) investors from other entrepreneurs. These are mostly US, Japanese and South Korean companies, which were established with the aim of supplying the EU markets from a relatively cheap location, which is close geographically to the targeted market. (And eventually will become part of it.) These companies are “forced” to use local suppliers in order to meet the local content requirements, if they want to qualify for the preferential tariff treatment, which is applied to products exported from Hungary to EU-markets. In many cases these affiliates are actively pursuing a strategy of enabling local companies to integrate themselves into the supplier network. Suzuki is a good example of a greenfield investment, which basically does not fit in the Hungarian economic environment, is export-oriented, however, in order to qualify for preferential tariffs, it had to fulfil local content requirements. This latter consists of the value added inside the factors, and local supplies. Not only Suzuki, but also the Japanese first tier automotive supplier Denso actively searched for Hungarian suppliers. The company has a number of Hungarian, and more EU suppliers. Because Denso is rather cost sensitive, it continuously searches for new cheaper suppliers. This would mean opportunities for Hungarian SMEs. Denso developed and uses a strict multilevel evaluation program. Denso started recruitment with a meeting of some 100 firms of the nearby region. The products were introduced, and technical parameters set for those parts that could be purchased locally. Next potential suppliers made offers that were evaluated. Denso staff visited promising companies thereafter. After receiving positive feedback a first batch of sample production is ordered. In case of more sophisticated products an investigation in the Japan Headquarters follows. Not only quality, but durability is also tested: a fairly time consuming procedure. After positive signal from the lab, Denso visits the supplier again checks equipment, company management and finance from the point of view of regular and reliable delivery at constant quality. After these conditions were met the supplier may be contracted, if the parties can agree about sequencing, quantities, deadlines and price, which is usually not very high. In fact, low prices are counterbalanced by large-scale batches that make production profitable. Only a few firms qualified, but Denso believes that through substantial investments in equipment, measuring devices and in quality control systems, suppliers technology level can be upgraded to the required level. Unfortunately, no mention was made if Denso also actively supported potential partners’ efforts.

3.8.Global strategies of TNCs

The industries, most important from the point of view of recruiting local suppliers and exercising substantial spillovers, namely the automotive and electronics industries, operate more and more in the production networks of international partners. (Meyer, 1998) One strong partner usually dominates these international networks, which replace integrated TNCs. Longer-term supply contracts are characteristic of them. These form barriers to entry into the production network for local firms. Big automotive producers do not outsource the production of parts and components, which are the essence of the given brand. In 2002, the big automotive companies did not produce themselves about 50 % of cars, but sourced from suppliers. (Gelei, Nagy, 2005) Thus the key question in terms of the impact of FDI on local industries in a transition economy is whether companies of the host country can be and to what extent they can be integrated into these production networks. In some cases, even in the case of privatised companies, domestic suppliers can be replaced by global suppliers of the parent company. At the same time, in some cases a domestic company, successfully meeting

the supplier requirements of a local affiliate, may become a supplier of other affiliates of the given TNC or of other local affiliates. Due to the method of organisation of suppliers, the number of those Hungarian companies is increasing, which do not supply directly the big automotive companies, but their most important foreign suppliers. For example, the small-medium sized Arge 2000 company exports automotive spare parts to the foreign suppliers of the car manufacturers of Porsche, Mercedes and Volvo.

It is important to note, that second and first tier suppliers of the big automotive TNCs also went through a merger and acquisition wave (due to the increased and demanding outsourcing activity of carmakers). Thus, the global market of automotive suppliers is in the process of concentration, and the number of global players may be down to less than 30. This concentration also has a limiting effect on the potential involvement of Hungarian suppliers. Similar tendencies may be present on the global market of suppliers of the electronics industry.

3.9. Affiliates' role in production networks

The extent of local linkages also depends on the affiliate's position in the network of the TNC. (Vince, 2001, based on questionnaire-based interviews with 49 companies in the machinery industry.) Two groups of companies with foreign participation can be distinguished according to their reliance on local suppliers. In the first group of majority foreign owned companies with tight ownership control, the owner is a big multinational company, which controls every walk of life of the affiliate. Many greenfield investments in Hungary belong to this group. Inputs and outputs are traded inside the company; production in the affiliate is centred on components and spare parts or on assembling them in final products. From industrial economics point of view, this type of activity is rather similar to subcontracting. In both cases some handling and assembling of imported components is carried out, and the total output is delivered back to the same foreign company. The share of local suppliers is low, and they are providing mainly services. A study of Majcen et al (2003) proved that these assemblers had very low level of independence in decision making and were rather only to carry out the orders of the headquarters. This means that they are effectively cut from the local business community.

In the second group, (Vince, 2001) the foreign owner companies of Hungarian affiliates are usually "smaller-sized" TNCs. Besides some greenfield investments, there are mainly acquisitions (mostly in the framework of privatisation) with significant changes carried out in the original production structure, technology etc. The affiliates have their own products (brand names) and sell ready-made products, too. These affiliates usually rely more on domestic suppliers, they are more independent in their decisions, concerning the share of local supplies. Thus, they can be integrated more fully in the local economy and spillover effects originating from their cooperation with local suppliers may be more substantial.

For affiliates in Hungary, there are big differences in terms of their independency concerning local supplies and local suppliers. While lower local independence usually goes together with lower local supplies (e.g. in the case of Audi, Temic, Nokia), there are important exceptions to that rule (e.g. Sanyo, ZF Hungaria). For these latter companies, other factors may influence more strongly the development of local supplies (e.g. for Sanyo, local content requirements). Local supply decision may be taken first of all by affiliates, which have a regional production task, or produce products which are exclusively produced in Hungary, or for which using local supplies is more advantageous than imports (e.g. because of specific transport costs). On

the other hand, on the basis of anecdotal evidence, there seem to be stages in the independency of affiliates. In the first stage of activities, affiliates usually do not take local supply decisions, while in later stages, due to their local experiences with a few suppliers, they may have more independence in choosing local suppliers.

4. Are supplier networks good basis for cluster development?

Transnational corporations are desired participants of clusters (Solvell 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 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 case of stable supplier contacts technology transfer and enabling policies provided for suppliers are rather usual. The intensity of such linkages very much depend 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 cooperation of heterogeneous partners, also including transnational companies.

As is seen, big international firms may play important role in many important functions of the clusters. The 2003 large international cluster survey identified transnational companies as important players of clusters (Solvell, et al. 2003). However, in that survey developed market economies were very much overrepresented. Patterns of cluster development were found different in emerging market economies (Ketels et al. 2006). The first major difference was in the perceptions about the role of clusters. While in developed countries clusters were treated as an important tool to curb innovation process, both developing countries' and transition economies' economic policy regarded clusters as tools for other policy purposes like regional development, foreign investment attraction, SME development. The other main difference was found in the levels of social capital. While also developed countries' clusters spent much energy with trust building, this function was regarded as precondition for any cooperation in the clusters in transition economies. Hence there is an acute, overwhelming lack of trust and also entrepreneurial culture and experience of long-term cooperation. Moreover, the frequent changes in economic policy and institutions result also in low levels of trust towards the governments, and in the dominance of short-term business considerations over more perspective strategies. These factors thwart cluster development and provide also different emphasis for cluster activities. Low level of trust among cluster members (especially the SMEs) does not support cooperation on strategic levels, like for example joint R & D projects. Much more emphasis is given to more simple functions like joint marketing or procurement, lobbying, training. We must consider these specificities when discussing the potential role of supplier networks in cluster development.

Three questions need to be analyzed in order to see the potential role of TNCs and their partners in cluster development. The first issue is if TNCs are interested in developing local business contacts at all was discussed in the previous section. The next problem is if TNC-

integrated supplier networks are suitable for the development of clusters? The main part of this section deals with this topic. And there is also a third question whether TNCs might be interested in developing regional clusters for their own strategic interests? The examples of many clusters in developed economies, especially dynamic clusters indicate that participating in local knowledge generating networks effectively attract all TNCs.

We think that at least for the time being emerging market economies do not offer strong conditions for knowledge based dynamic clusters or 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 emerging market economies than in 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 existing supplier networks of TNCs.

4.1. Ways of developing supplier networks and their cluster-forming potential

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 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 started to settle in important agglomerations already in the 1990s, meanwhile cluster development (meaning formal cluster initiatives) started only after 2000. Causal relations are rather unclear, hence these regions used to be rather developed industrial centers already prior to the transition period, hence their production potentials very much contributed to FDI attraction. Later this attraction potential was further strengthened by the TNCs themselves. Leading 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 large extent to the creation of sufficient pools of specialized firms within close vicinity. OEMs also exercised 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 form of tax and customs relief, provided they exported their output entirely. Tax free zones became hubs for greenfield investments, that also incorporated many Hungarian suppliers (Antaloczy and Sass, 2001).

Much of the export-oriented greenfield 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 in rare occasions settled OEMs with similar final product into the same hub. They separated themselves from their competitors, and seemed to prefer separation of their supplier network as well (Szalavetz, 2003).

Consequently, significant concentrations of specialized firms were created in Hungary's more developed areas. These networks consisted of 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 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 OEMs avoided contacting other OEMs of their branch, but horizontal linkages of suppliers were also curtailed (at least not promoted). This means contacts to other TNCs, but also linkages among suppliers (for example in the case of Electrolux). There is some evidence that TNCs liked sporadic suppliers also because they could bargain lower prices when handling with separated, individual companies (Szanyi, 2008). Summing up, FDI created hot pots 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 in the previous section as more likely leading to the development of supplier networks. From the point of view of the development of horizontal linkages, or the possibility of becoming suppliers of several firms, various OEMs there is anecdotal evidence proving that the linkages were more frequent in these cases. However, TNCs were 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 greenfield investments.

Another aspect of cluster development is the heterogeneity of 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 off deals that lasts until favorable 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 of their attention. Therefore, 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 much empirical evidence that show how even greenfield investments changed their nature and behavior (Szalavetz, 2005; Szanyi, 2003, Hunya, 2001). For 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 affiliates' activity in the global corporate networks is in line with the current wave of concentrating on core competences and outsourcing/offshoring much of the activities (Sass, 2008). The more activities are carried out locally the more likely 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 increase for organizing these contacts and actors in some formal ways. Clustering process may get started from the bottom too.

Recent experiences with labor 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 labor 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 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, maybe also other actors raised their interest also support the cluster idea and increases chances for proper cluster actions.

Concerning the coexistence of cooperation and competition Hungarian clusters may play 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 important role in organizing various programs for the development of 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 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 tier 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. 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 (Solvell, 2003, CLOE, 2005). Achieving 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. Membership of 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 favorable condition of the supplier network is utilized, namely that there is a pool of potential cluster members. 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 away from simple 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, so that regular cluster functions are developed.

4.2. Policy relevance and empirical evidence

Clusters and cluster policies started to evolve only 8 years ago, yet, there are already a few empirical surveys concentrating on the development of clusters in Hungary. Gecse (2004) provided a list of 22 clusters for the year 2003. Out of these 22 organizations at least half had some strong TNC participation, mainly in the field of automotive and electronics industries (branches targeted by FDI attraction policy). When compared this list with the most recent one in Szanyi (2008) we can see that only 10 of the mentioned 22 operated in 2007. All others failed to exist. Among the survivors there were some TNC-oriented clusters like PANAC, the show-case automotive cluster. Some others underwent major changes. PANEL in electronics for example had to change name and core activity after the break with its former member IBM Storage Products Plc. Obviously, this cluster did not reach stability providing critical mass. Also PANAC had to change philosophy and partly also activities after a major crisis in 2004/5 earmarked by dropping membership. The new action plan concentrates on such "new" areas of cluster development like adjusted procurement policy and joint marketing actions, or the organization of general assembly of members. Management realized that there were general features and functions of cluster organizations that were vital especially for SMEs but neglected by the previous management. A more balanced cluster management activity soon turned the ties PANAC regained momentum.

Replacing the failed organizations many new started activity especially in 2005/6 with the introduction of some new cluster promotion schemes of economic policy. But here again many of the grant winner clusters did not show signs of proper cluster 1-2 years afterwards (Szanyi, 2008). Failed clusters were usually not bound to major TNCs. Hence, we may come to the conclusion that in case of TNC involvement clusters' organization has economic rational, while many of the cluster organizations of local SMEs are rather rent seeking virtual clusters. Nevertheless, clusters with TNC participation may also be rather fragile. This is the case when general functions of the cluster are underdeveloped, especially if activities are of horizontal direction and no collaboration is developed among SMEs and among other cluster members (universities, research laboratories). Unfortunately, TNCs are in some cases not interested in the development of horizontal cooperation links. They would rather like their suppliers isolated and not establishing a joint interest platform that can also increase SMEs bargaining power against them.

The two questionnaire-based surveys of Hungarian clusters (SEED, 2003; Netwin, 2007) also proved that Hungarian clusters' internal cooperation was rather weak and was focused mainly on the establishment of the cluster organization, not so much on essential for cluster members activities. Both papers raised concerns regarding the efficiency of cluster development policies, and called for actions. The grants for cluster support should be awarded in competition rather, than on normative basis, and the use of the grants controlled over the

project lifespan. Another request was the establishment of a cluster accreditation system that provides transparent and relevant qualification requirements. Such an accreditation scheme is being introduced recently in 2008, with strong emphasis of innovative measures. This means that the Hungarian government followed EC guidelines and made cluster policies a tool of innovation policy. There is a danger that this new emphasis shifts attention from general cluster characteristics again: the cluster is not supported for its own sake but to promote other superior policy targets.

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