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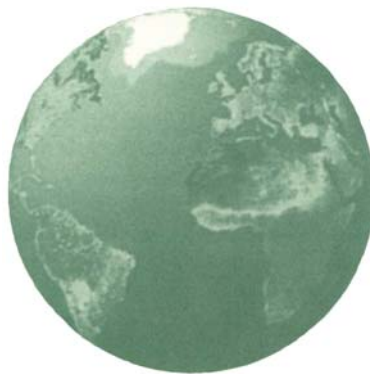
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**CLUSTERS AND THE DEVELOPMENT OF SUPPLIER  
NETWORKS FOR TRANSNATIONAL COMPANIES**



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## SUMMARY

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Clusters, an important tool for providing matching answers to challenges from transnational companies, are regional concentrations of firms, research and education institutions, regional development bodies and other participants sharing some joint technological platform and aiming to increase their joint competitive strength through collaboration at various levels of activity. Transnationals may become involved in clusters in various countries, *e.g.* through affiliates in host economies. One form of cluster may be collaboration of transnationals and their partners and suppliers. The paper analyses the main attributes of clusters and the rationale behind them, before considering the inclination of transnationals to develop supplier networks. It goes on to describe the activities and levels of cooperation among transnationals—chiefly original equipment manufacturers (OEMs)—and local suppliers. Based on analysis of supplier network patterns, the paper compares this cooperation content with typical activities in successful clusters. It mainly deals with Hungarian experiences, though most may also be relevant to other transition economies. The main finding is that transnational companies' primary interest lies elsewhere, not in cluster development, but that in the presence of strong local initiative and professional cluster management they may gain interest in cluster activity of certain types.

## 1) CLUSTER CONCEPT AND DEFINITIONS\*

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Spatial concentration and specialization of economic activities has been recognized and analysed for over a century. Alfred Marshall (1890) studied determinants of industrial agglomerations and found three decisive factors: access to a developed labour market and deep supplier background, and the possibility of rapid knowledge and information transfer among firms. More recent publications make similar points (Krugman 1995, Venables 2001).

The main rationale behind spatial concentration is to achieve agglomeration economies. A distinction has been made between different types of agglomeration economies (*i.e.* various kinds of rationale behind the 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 the external economies enjoyed by firms through from the large scale of operations

of the whole agglomeration. These forces lead to the emergence of industrial-core and metropolitan regions. A second type consists of the more specific economies for firms engaged in similar or linked activities that lead to the emergence of industrial districts (localization economies). Such districts provide a base for flexible production systems that can serve volatile markets. In both cases, the agglomeration economies are rooted in functioning processes where linkages among firms, institutions and infrastructure in a given location give rise to economies of scale and scope, *e.g.*, the development of general labour markets and pools of specialized skills, dense interactions between local suppliers and customers, and shared infrastructure and other localized externalities. Agglomeration economies arise when such links lower costs and increase returns for 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 seminal work by Michael Porter (1990, 1998 and 2003), whose “diamond model” posits four sets of related forces to explain industrial dynamics and competitiveness, associated with factor input conditions, sophisticated local demand conditions, related and supported industries, and firm structure, strategy and rivalry. A core notion around his model stresses how a collaborative, mutually supportive group of actors may enhance regional competitiveness in global markets and thereby generate growth and other benefits. There has also been exploration and emphasis on the significance of face-to-face contacts and personal demonstration, exchange of experience, and the role of geographical proximity to knowledge transfers and innovation.

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Another line of related economic thought elaborated on knowledge creation and innovation as a social process engaging individuals that exchange tacit and explicit knowledge. The importance of social networks in the functioning of clusters was stressed by Pouder and St. John (1996) and Saxenian (1994). Trust-based relationships and social capital may be important for enabling horizontal cooperation between individuals within and across firms and institutions. Here clusters are not just fixed flows of goods and services or production inputs, but dynamic arrangements based on knowledge generation and innovation in a broad sense. Innovation, knowledge generation and transfer become primary explanatory factors of dynamic clusters as new agglomeration types.

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

Clusters are defined in many different ways by authors (*e.g.* EC 2003; ICEG 2006; Clement and Welbich-Macek 2007; Europe Cluster Observatory, 2007) wishing to concretize interpretations of Porter's very loose original definition as "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 com-

pete but also co-operate" (Porter 1998, p. 199).

Four features are seen as crucial: geographic concentration, specialization, alliance among heterogeneous market agents and institutions, and the co-presence of competition and cooperation among them. All these four elements are indeed crucial, as they express the complex links of clusters with Porter's overall concept of competitiveness. 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 with clusters. One current emphasis in EU policy is innovation; support for innovative clusters appears in the 2007–14 budget. Clusters are usually innovative in a broad sense and innovations the main outputs of the synergies of cluster cooperation. But there is a risk of government misinterpreting the innovative cluster phenomenon and confining clustering to branches regarded as innovative (hi-tech). Another risk is that overemphasis on innovation in cluster activities may mean less heed to crucial basic cooperation functions that are likewise vital to a solid base of innovative cooperation. So narrowing the original cluster concept may effectively block important cluster functions.

## 2) CLUSTERS AND THEIR SPECIFIC FEATURES

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This section points to some main elements of clusters commonly cited in theoretical and empirical literature. The features need not be present in all clusters, nor

should they be insisted upon in policy-making. They illustrate the most common features of modern co-locations of firms called clusters and determine the tasks and activity of cluster organizations.

## 2.1. Spatial concentration

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Spatial concentration has always been central to the concept. Though some have tried to disprove or query the importance of physical agglomeration, there are many aspects that remain central to the cluster concept. Venables (2001) proved that “death of distance”—extensive use of modern IT and other technological advances—does not necessarily weaken agglomeration effects. Some effects weaken, others strengthen. So the structure of the balance of centrifugal and centripetal forces has probably changed, as have the structure and functions of agglomerations, but agglomerations and clusters remain strong features of regional development.

The facts underpinning the importance of geographical concentration described in the previous section have remained largely unchanged since the seminal works of Marshall (1890), but their weights have altered. Economies of scale and scope from sharing infrastructure and information, and from the proximity of suppliers, factor markets and customer demand, continue to reduce the transaction costs of arms-length business. So firms may feel that their membership of a set of inter-related actors, which can in a given region enhance efficiency, supports their productivity growth and enhances their innovativeness, notably through better access to knowledge, ideas

and skills. One of this set of potential advantages that demands special attention is access to specialized factor markets. This allows companies to concentrate on their core competencies and outsource auxiliary activities to specialized suppliers. Increased flexibility is achieved through cooperative production networks, in most cases based on a dense population of firms with related activities. Networks operating within clusters may enhance cooperation in areas as diverse as training, finance, technological development, product design, marketing, exports or distribution.

## 2.2. Specialization

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Clusters are usually viewed as organizations or networks of participating actors linked via a kind of core activity, which provides clear emphasis on the same markets and processes. Traditional clusters showed strong sectoral specialization patterns. But various studies have found that many clusters have limited transactions among firms within the cluster, *e.g.* in the form of buyer-supplier contacts. Attention has gradually shifted to the significance of knowledge spillovers and to dynamic clusters. While Porter was mainly concerned with the existence and reproduction of clusters of technologically related firms, latest attempts are targeted at analysing the 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 spectrum of skills and competencies, where interaction among different actors leads to new, often unexpected ideas. The

concept of dynamic clusters elaborated and introduced by Sölvell *et al.* (2003) is very much in line with current developments in the production factors engaging technology and skills intensively, with the increasing knowledge content of traded goods, and with services becoming more pervasive.

Specialization in dynamic clusters is not primarily expressed in co-location of business entities in a given sector or dense business contacts. Nor is specialization viewed necessarily as limited to a given product or industry category. A 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 calls for a strong element of complementary specialization between actors, a common denominator. Actors focusing on core business can couple up to these useful common-denominator linkages, as important synergies in a learning process that engages various organizations. Examples of such inter-sectoral specialization areas are telematics, biotechnology and many other areas utilizing an interdisciplinary approach in their innovation process. The emphasis in dynamic clusters is on the role of knowledge generation, innovation and information exchange, in contrast with traditional clusters, which makes this one of their most important functions. Information sharing and innovation also occur in traditional clusters, but their prime function is to enhance regular trading contacts and production via various economies of scale and scope.

### 2.3. Cluster actors

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Plurality is essential to clusters, which must consist of various kinds of actors, not just firms, if they are to be successful. Without such plurality, an agglomeration is no more than an enlarged enterprise—a network of companies in which one has the prime role, where smaller firms may just serve as subcontractors or clients. This distinction is not trivial. There is strong motivation to reduce transaction costs and friction between firms by concentrating activities in single firms and a strongly dependent supplier network. But today's costs of administration, management and control, risk management, and search for sources of flexibility favour a stronger focus on the core business of a 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 a fairly large number of small and medium-sized firms (SMEs). Clusters may also involve intensive links and alliances with institutions like universities, research institutes, public authorities, consumer organizations, think tanks, *etc.* Sölvell *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 institutions for collaboration, defined as formal or informal actors to promote interest in the cluster initiative among the actors. Their role may vary widely. They may promote cluster initiatives (top-down development of cluster cooperation) or perform a series of cluster actions.

## 2.4. Competition and cooperation in clusters

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Connections between cluster actors display simultaneous competition and cooperation. Even in clusters, competition remains an important element of the market, delivering major incentives to improve corporate performance by reducing prices, increasing quality and reliability, searching for new products and markets, and boosting innovation. Clusters are not about reducing the importance or extent of competition. Nor should they serve as elite clubs seeking privileges for their members, but remain open to new entrants. Open entry can also give new impetus, providing a source of new technologies and knowledge for incumbents as well.

At the same time, actors in a cluster may cooperate round a core activity using their competencies to complement each other. Firms operating in tandem may be able to attract fresh resources and services not available to isolated firms. By pooling resources and risks and developing complementary functions, firms achieve economies of scale and scope. Central to the quality of cluster information exchange and knowledge flows are trust and recognition. Here trust is about sharing a vision and belief in mutually fruitful relations. Building trust means people enabling others to believe in their mutual long-term benefit. This may be demanding on first contact, especially as new actors enter new markets.

While proximity matters for informal knowledge flows, global linkages are equally essential. Transnationals are primary sources of skill and knowledge transfer and have been decisive to the development of many local clusters. Many

clusters have lively contacts with actors outside the region. This is reinforced by globalization and post-Ford disintegration of production systems. The internal knowledge-pool of firms is complemented by a knowledge base distributed through their whole value chains, where much knowledge enters the cluster in the form of new machinery, intermediate inputs, or ordering specifications. There may be an extensive interface between cluster firms and their outside environment.

## 2.5. Critical mass

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Inner dynamics can be achieved only if numerous actors participate in the cluster, providing the critical mass needed to obtain various economies of scale and scope. These require multiple interactions, along with a variety of possible combinations, a sufficient pool for choice, and a process of learning by doing. The presence of critical mass may also give support to industrial restructuring in a cluster, by fostering linkages and complementarities between flexible SMEs and larger corporations. Critical mass may serve as a partial buffer against exogenous shocks and pressures, including loss of important, even key member companies. Lack of it can leave a region or cluster vulnerable to the loss of specific resources and skills essential to cluster development. Path dependence too means economic development is likely to be focused on places possessed of a critical accumulation of assets and skills. Nonetheless, it is not possible to say what constitutes a sufficient level of mass, or even exactly how it should be measured.

## 2.6. The life cycle of a cluster

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A further important element of clusters is mode of organization: how the actors are linked. Cluster organization usually undergoes changes between periods in the cluster life cycle. Clusters are not temporary solutions to acute problems. They have a sense of direction and inner stability over time, but their structure is not rigid or static, and experience shows they have development stages. These may not be identical, any more than the pace of development need be similar. But there is an inherent logic in the way clusters develop, so that some characteristic patterns can be discerned.

The *first* or pre-cluster stage entails simple co-location of various market actors with potential for institutionalized cooperation activities. The *second*, emerging stage is where several actors in an agglomeration start to cooperate round a core activity and realize joint opportunities through their linkages. The *third* stage of cluster development is to attract new entrants through positive experiences of collaboration. Recruits may be engaged in the same or related core activities and be present in the geographical vicinity of the developing cluster. Organization of cluster activity may be the initial activity of formal or informal institutions for collaboration. The outside face of the cluster becomes established in the form of a label, website, *etc.* A *mature* cluster is one that has reached the critical mass for long-term stable existence and developed external relations with other clusters, activities and regions. There is an internal dynamic of new-firm creation through start-ups, joint ventures and spin-offs. In the *final* stage a mature cluster trans-

forms into new cluster organizations. In time, the core competencies of firms and clusters change in response to changes in markets, technologies and processes. A cluster must innovate and respond to survive, stay sustainable and avoid stagnation. This can mean changing into one or more new clusters focused round new core activities (SRI International 2001).

## 2.7. Cluster activities

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Clusters may vary in many ways. They may evolve in organic bottom-up ways or be initiated by development institutions. Their sectoral focus may range from agriculture and manufacturing to high value-added services. They may be supported by an institution for cooperation or serve as a branch of a regional development agency. These differences influence the organizational structure, main aims and strategic goals of a cluster, and the activities performed. Still, there are four main areas and types of activities generally pursued by clusters: *social capital* development, development of *strategic linkages*, creation of *vision and strategy*, and *specific actions*.

Social capital is one of the main framework conditions of functioning clusters. The first step is to prepare the ground for the cluster initiative. The communication process is launched by establishing among key actors an awareness of the potential mutual benefits of clustering. Open communication and transparency between key actors is crucial to building the necessary trust. Cluster initiatives may need to nurture trust by broadening the scope of information-sharing and establishing of advanced



knowledge networks. This typically succeeds in successful clusters in broadening the number of committed actors and keeping the cluster open and outward-oriented. This way the contribution of the group far exceeds that of individual firms. Furthermore, the cluster may achieve critical mass by incorporating new entrants. Difficulties in launching the cluster initiative may be substantial, as the risks and costs firms have to expect when participating may often be perceived as insurmountable. This may make SMEs particularly hesitate to spend time and effort on a network with vaguely defined objectives. They may also fear losing strategic assets and other information to other cluster members, especially large firms. So they may wish to start with less strategic alliances before entering into more complex cooperation tasks.

The initial step at this stage is to formalize existing linkages. This is the point at which most cluster initiatives are launched; they belong to the network of formalized linkages through establishment of an institution of cooperation. Structured routines for interactions are formulated and cluster vision and strategy developed. This is often supported by competence auditing, a kind of mapping of the competitive advantages of the region and the competencies of the participating actors, and determining what gaps remain. A visualized form of the audit results is a 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 in identifying cooperation possibilities for various corporate functions. The matrix can be also used by firms as a reference and

sales argument to illustrate their extended cooperation network. Preparation of the competence system matrix is especially useful for newly funded clusters, where there is insufficient information on individual actors.

Cluster initiatives may wish to develop a shared vision, common goals and strategy for achievement. A detailed regional analysis can help to structure the starting point of collaboration. Usually, goals of cluster development and the baseline for possible future evaluation are put in place at this stage as well. Institutions for cooperation will gain more sense of direction if the appropriate coverage and scope for the evaluation process is defined. A main goal of a cluster initiative seeking to remain viable in the long run is to become self-sustainable at some stage of development. When the key competencies are clear, a strategic analysis is prepared to assess the current situation and project possible future developments. The most popular of the many proven heuristic and statistical methods for use in this work have been foresight exercises, which usually involves knowledgeable agents and key stakeholders. This method is valuable for gathering 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 also be beneficial by facilitating commitment and engagement. Goals and action plans will also require adjustments, as clusters need continuously to redefine their visions and strategies if they are to stay innovative. So strategic planning and implementation is an iterative, inter-related process.

Once vision and strategy have been defined, the implementation of tasks can begin. This requires a set of cluster actions that follow a defined plan of action and are applied as a way of strengthening the cluster initiative and improving the surrounding competitive environment. *Table 1* lists a few of the cluster actions commonly undertaken.

Cluster actors' objectives when joining the initiative may be different or even contradictory. Objectives of the major types of actors will be diverse by definition. Firms may be motivated by possible

access to complementary skills of other firms, regional policy makers and institutions are interested in local growth and prosperity, while politicians may be looking for kudos and extra 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 as improving the foundations for economic activity (cluster environment) or improving conditions of

Table 1  
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"> <li>• Seminars, meetings, workshops to ease technology diffusion in cluster.</li> <li>• Establish centres to develop new production technologies.</li> <li>• Create observatory of technical trends.</li> </ul> <p><i>Firm growth:</i></p> <ul style="list-style-type: none"> <li>• Support cluster-based incubators.</li> <li>• Encourage entrepreneur networks.</li> <li>• Provide business assistance.</li> <li>• Launch marketing and image campaigns to attract new firms.</li> <li>• Improve FDI incentives.</li> <li>• Improve financing conditions for spin-offs by regulatory changes or special mechanisms or investment funds.</li> </ul>	<p><i>Networking:</i></p> <ul style="list-style-type: none"> <li>• Form cross-agency cluster teams.</li> <li>• Foster firm networks.</li> <li>• Foster sharing of personal networks.</li> <li>• Facilitate external connections.</li> </ul> <p><i>Commercial cooperation:</i></p> <ul style="list-style-type: none"> <li>• Form export networks.</li> <li>• Compile market intelligence.</li> <li>• Coordinate purchasing.</li> <li>• Establish technical standards.</li> </ul> <p><i>Joint R &amp; D projects</i></p>	<p><i>Cluster analysis:</i></p> <ul style="list-style-type: none"> <li>• Conduct a competence audit.</li> <li>• Undertake a strategic study and analysis.</li> <li>• Model and amplify systemic relationships.</li> <li>• Conduct benchmarking analysis.</li> <li>• Organize and disseminate information in the cluster.</li> </ul> <p><i>Engagement and service delivery:</i></p> <ul style="list-style-type: none"> <li>• Create or formalize institution for cooperation and communication channels.</li> <li>• Improve cluster awareness.</li> <li>• Ease interaction between various government areas and cluster actors.</li> </ul> <p><i>Cluster marketing:</i></p> <ul style="list-style-type: none"> <li>• Create brand for region.</li> <li>• Actively promote cluster.</li> <li>• Target inward investment.</li> </ul>	<p><i>Specialized labour supply:</i></p> <ul style="list-style-type: none"> <li>• Provide management and technical training.</li> <li>• Use clusters as context for learning.</li> <li>• Establish cluster skill centres.</li> <li>• Attract talent to region.</li> </ul> <p><i>Specialized capital markets:</i></p> <ul style="list-style-type: none"> <li>• Prioritize investments in cluster projects.</li> <li>• Give incentives or set aside funds for multi-firm projects.</li> <li>• Promote joint financing, creation of special investment funds, or provision of credit guarantees.</li> <li>• Encourage sharing of risk across cluster actors.</li> <li>• Improve access to and usage of natural resources.</li> </ul>	<p><i>Legal framework:</i></p> <ul style="list-style-type: none"> <li>• Improve framework conditions.</li> <li>• Evaluate competition policy.</li> </ul> <p><i>Infrastructure:</i></p> <ul style="list-style-type: none"> <li>• Develop new or improve existing infrastructure through joint actions and new financing models.</li> <li>• Conduct private infrastructure projects.</li> </ul> <p><i>Social capital:</i></p> <ul style="list-style-type: none"> <li>• Foster expansion of personal networks.</li> <li>• Foster inter-firm communications and networks.</li> </ul> <p><i>S &amp; T and R &amp; D framework:</i></p> <ul style="list-style-type: none"> <li>• Support mutual realization or financing of R &amp; D projects.</li> </ul>

Source: Andersson *et al.* 2004.

the cluster (cluster dynamics). For the strength and dynamics of the cluster in 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

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Linkages with affiliates of transnational corporations operating in Hungary can form a good basis for deeper relationships between domestic firms and firms with foreign participation, including the formation of a cluster, as some cases in Hungary have shown. A supplier relationship provides a potential basis for deeper cooperation, and according to some theorists, it can in itself be regarded as a low-level cluster (Bakács, Czakó and Sass 2006). All in all, the share of local suppliers in Hungary is lower than in more developed countries (*e.g.* the EU 15) and higher than in less developed ones. The level of local supplies remains lower than was expected at the time when the country opened up to FDI (Sass and Szanyi 2004).

The share of local (backward) linkages of companies with foreign participation depends on several factors. This section concentrates on backward linkages and on manufacturing companies, listing the factors that influence the inclination of companies to foreign participation in their use of local suppliers (based on UNCTAD 2001), complemented by other factors

found relevant on the basis of literature or company case studies. Moreover, available empirical evidence shows how these factors affect the share of local suppliers in Hungary, which have remained below the expectations so far. For this we first use the results of a questionnaire survey,<sup>1</sup> and secondly draw evidence from secondary sources (Hungarian literature on the topic and company case studies). Where information is available, we also present results from other comparable countries.

#### 3.1. The mode of FDI entry

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There are investment-type differences in local value added and use of local suppliers. (See Blomström *et al.* 2000, Sass 1997 for Hungarian companies based on the results of a questionnaire survey, or Szanyi 2001.) Understandably, some privatized companies retained their original domestic suppliers after restructuring, particularly if their main focus was on the domestic market. In the case of Tungsram in Hungary (a light-source manufacturer acquired by GE), the share of local suppliers is over 40 per cent, or in the case of Siemens (which acquired the Hungarian telephone company through privatization), the corresponding share is 35 per cent. For Electrolux

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<sup>1</sup> The questionnaire survey was carried out under the 5th framework programme research project SERD-2002-00111, 6th work package: Foreign and domestic firms as catalysts in changes in competitiveness in manufacturing. Four sectors (food, electronics, automotive and pharmaceutical) and companies employing more than 50 workers (in pharmaceuticals more than 20 workers) were analysed. There were responses from 161 companies giving mainly information on company networks and linkages, for 1998 and 2004. Selected findings of the questionnaire survey appear in Sass 2007.

(which bought the Lehel factory in the white goods sector), the share of local supplies for certain products reaches 80 per cent. The targets of these privatization transactions were relatively successful Hungarian companies, with a long history and tradition, and in Tungsram's case a brand name and intense cooperation with foreign partners in production and trade before privatization. The activity specifics of these companies made it possible for other Hungarian companies to maintain supplier relationships or join in the supplier network to them. The current names of other companies in the group are ZF Hungária Ltd, Knorr-Bremse Ltd, ABB Ltd and Rába (*Table 2*).

as Tungsram (DL) by Philips, Nokia and Sony, each was using local sources for less than 10 per cent of supplies. The results of the questionnaire survey confirmed the existence of a link between mode of entry and share of local suppliers. For privatized companies, it lay between 60 and 70 per cent of total inputs between 1998 and 2004, declining slightly over time. For greenfield investment it was 20–30 per cent, but growing slightly over time.

With Hungary's relatively long history of greenfield FDI, there is already evidence in the economy of new networks being created by greenfield investors (Barta 2002; Szanyi 2002) There is also

Table 2  
Shares of local suppliers in privatized companies

Company	Sector	Hungarian suppliers' share by local value added, %
ABB Ltd	Energetics, machinery	45
Adtranz Ltd	Diesel trains, freight trains	55
BPW-Rába	Truck chassis	35
Electrolux Lehel Ltd	White goods	40
GE Lighting Tungsram	Light sources	50
Knorr-Bremse Ltd	Brake structures	30
SVT-Wamsler	Consumer electronics goods	55
ZF Hungária Ltd	Gear boxes	35

Source: Ipargazdasági Kft. 2002A.

With greenfield investment, though, it can take a long time to build up a local network of suppliers. Many greenfield investors use only a limited number of local suppliers, although in most cases there is an increase as the company settles in (*Table 3*). Examples include Audi, Flextronics, LuK Savaria, Nokia, Samsung, Temic, and Visteon. The local share of supplies to Audi (automotive industry), for instance, rose from less than 1 per cent to 10 per cent (including the impact of establishing an R and D centre). With greenfield investments in the same sector

evidence of agglomeration effects and clusters being formed in Northern Transdanubia and the Budapest conurbation (Buzás 2000; Grosz 2000; Barta 2002) around companies with foreign participation, mainly greenfield investments. These form part of the international networks of transnationals and are concentrated geographically in the part of the country where the most FDI has occurred. They consist mainly of firms with foreign participation, most of them established through greenfield investment.

Table 3  
The share of local supplies to greenfield investments in Hungary

Company	Production	Local Hungarian share of value added, %
Denso Ltd	Diesel feeder pumps	0
IBM Storage Ltd*	Hard disc drive	<5
LEAR Ltd.	Inner structures of vehicles	10
Opel Hungary Ltd	Engines, cylinder heads and gearboxes	<5
Philips group	Electronics goods	10
Phycomp Ltd	Assembly of condensers	0
Sony Hungária Ltd	Electronics goods	<5
Thyssen Production System Ltd.	Automotive goods	0
Tower Automotive Ltd	Assembly of parts of bodywork	0
Zeuna Starker Ltd	Exhaust-pipe structures	15
Zollner Elektronik Ltd	Electronics parts production	6

\* Production relocated to China in 2002.

Source: Ipargazdasági Kft. (2002A)

### 3.2. The share of foreign ownership

Companies with foreign participation operating in developing countries show a significant difference in their reliance on local suppliers between wholly foreign-owned companies and joint ventures. The latter have a higher level of local supplies to total input due to stronger local knowledge and links, and the enhanced local participation helps the local diffusion of knowledge, technology, *etc.* (Blomström and Sjöholm 1999). But an empirical survey in Romania (Javorcik, Smarzynska and Sparateanu 2003) shows significant positive local spillovers only wholly foreign-owned companies and not in joint ventures. Yet no such difference was detected in Lithuania (Smarzynska 2007). This has less relevance in Hungary, where the latest available data (2003<sup>2</sup>) shows 100 per cent foreign own-

<sup>2</sup> Source: Hungarian Central Statistical Office.

ership for two-thirds of companies with foreign participation were in 100% foreign ownership and the proportion has risen persistently in recent years.

### 3.3. Sectoral differences

The sectoral structure of FDI also has an impact on the degree of use of local suppliers (Tavares and Young 2006). Sectors with a lower propensity to involve local suppliers (UNCTAD 2001) include some machinery sub-sectors, especially automotive and electronics. Among other things, the subtle production networks set up in these sectors create an entry barrier for new suppliers explainable by the specificity of the product or technology and the high quality requirements of export-oriented investors. At the other extreme, foreign affiliates in the food industry or production of building materials, with relatively closed, small markets and high transport costs rely on local supplies to a great extent. It is important

to assess the “supply capacity” of sectors as well: rubber, plastic and metal producing, for instance, can provide spare parts or components to a number of machinery sub-sectors (electronics, automotive, general machinery production). This is also the case in Hungary, where these sectors account for the overwhelming majority of manufacturing suppliers.

The structure of supplier “pyramids” differs in the various sectors using local supplies (Ipargazdasági Kft. 2002A). In Hungary, there are transnationals in the machinery, automotive and electronics sectors carrying out end-assembly or producing complete main components and positioned at the top of the pyramid (e.g. Audi, Suzuki, Philips, Nokia and Ericsson), together with first-supplier transnationals (e.g. LuK, VAW, Visteon, Leoni, Flextronics, Temic and Elcoteq). Numerous second and third suppliers have also invested in Hungary. But the intensity of the links among these suppliers varies according to the level inside the pyramid. Hungarian suppliers usually join the second, third or further levels, which gives them little direct contact with the top company or first supplier. (See, for instance, Gelei and Nagy 2006 for Hungary’s car, or Ipargazdasági Kft. 2002A.)

The questionnaire survey supported the hypothesis of a sector effect on the intensity of local-supplier use. The food sector had the highest “local-supplier intensity” of 71–80 per cent of total inputs, followed by the pharmaceutical industry with 51–60. Significantly lower were the 21–30 per cent shares found in the electronics and automotive industries. (These data refer to the share of local supplies for all companies, whether foreign or domestically owned. For the foreign-owned, average shares were lower at 61–70 per cent for food, but with similar

shares in the pharmaceutical, electronics and car sectors.

The character of the activity carried out at the transnational’s local affiliate is also sector-related, according to the technological characteristics of the branch. Large assembly plants may base their activity solely on imported sub-assemblies, in which case the output share of local value added will usually be very low and import ratio extremely high. Assembly lines of this kind are located mainly in electronics and some other branches of engineering. The local contribution is mainly produced by unskilled labour employed at the assembly plant. Chances of supplies by other local companies are meagre, since the aim of the operation is to tap cheap unskilled labour. Local deliveries do not go beyond the bounds of facility management, catering, cleaning and guarding (all service activities), which are not, of course, essential to the main product and do not provide the desired positive external effects of improving local companies’ technological, managerial or marketing capabilities, or productivity or efficiency. There are some cases in Hungary of companies of this type, but the number is decreasing as labour costs rise.

### **3.4. Export-oriented versus domestic market-oriented investors**

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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 other factors, e.g. the sector of investment and the mode of FDI entry. Big, export-oriented greenfield projects are

usually less integrated into the local economy than their domestically oriented counterparts. So firms selling to the domestic market buy more local inputs (Altenburg 2000, Smarzynska 2002). Taking another approach, vertically integrated companies buy less local than their horizontally integrated counterparts (Caves 2007). It has been shown (Reuber *et al.* 1973) for developing countries that domestically oriented deploy more local suppliers than export-oriented affiliates. The group of large, export-oriented projects in Hungary is easily distinguished from other companies (Antalóczy and Sass 2003), because the production share of exports is usually close to 100 per cent and they are among the top Hungarian exporters (*Table 4*). The group includes Audi, Flextronics, Philips, IBM, Suzuki and Samsung, to name only the biggest. These large, greenfield, export-oriented projects had a maximum 10 per cent share of local supplies (including “purely” domestic and foreign-owned domestic). They represent almost one-fifth of Hungary’s total exports.<sup>3</sup> In the questionnaire survey of Hungarian companies (Sass 2007), enterprises could also be categorized into domestically oriented and export oriented groups. For the latter,

the share of local supplies was 20–30 per cent, increasing over time. For the former it was around 60–70 per cent.

### 3.5. Performance differences between “domestic” and “foreign” sectors

If the foreign sector differs largely from the domestic, this may affect negatively the formation of linkages between the two segments of the economy (Hunya 2001). An environment where the two groups form such segments may hinder the evolution of forward and backward linkages. But the importance of the factor may decline as firms with foreign participation become more established and familiar with the functioning of the economy, and the performance of domestic companies improves.

In Hungary, the two segments differ considerably. Many studies have found that the main differentiating factor among groups of Hungarian companies is ownership (and not unrelated to that, size). Companies with foreign participation do better by all measures of company

Table 4  
The top ten Hungarian exporters, 2005

	Company	Type of foreign share	Sector	Share of Hungary’s exports, %	Export/sales, %
1	MOL	Shareholding	Energy	9.6	47.9
2	Audi	Greenfield	Automotive	8.6	99.8
3	GE Hungary	Privatized	Electronics	4.4	98.0
4	Philips	Greenfield	Electronics	3.5	93.6
5	Flextronics	Greenfield	Electronics	2.9	97.3
6	IBM DSS	Greenfield	Electronics	1.8	99.9
7	Magyar Suzuki	Greenfield	Automotive	1.8	72.1
8	Alcoa–Köfém	Privatized	Metal working	1.5	94.1
9	Samsung	Greenfield	Electronics	1.3	77.6
10	Michelin	Greenfield	Autom. (tyres)	1.2	89.5

Source: Data published in the business weekly *HVG*.

performance, such as profitability, competitiveness or exports, than their domestic counterparts do. Labour productivity is significantly lower in the latter. The empirical evidence is still inconclusive on whether the difference between the performances of the two groups of companies is narrowing, which would give an impetus to more linkages between them.

### 3.6. The age of the investment

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Foreign-owned companies tend to increase the share of local inputs over time (Safarian 1966, Blomström and Kokko 1997). Even with greenfield and export-oriented investments, a gradual build-up of local supplies can be observed, though the share of these remains relatively low. Anecdotal evidence on companies with foreign participation underlines the importance of this factor. For example, a link between the age of the local affiliate and the quantity of local supplies was shown in Ireland (Görg and Ruane 2000), although no such link was found for European companies in another study (Tavares and Young 2006). Certain greenfield companies may have increased their local supplier base considerably since establishment. For example, the share of local supplies was below 1 per cent for the Hungarian Audi affiliate in 1997, but has increased to 10 per cent. The questionnaire survey (Sass 2007) showed an increase between 1998 and 2004 of a few percentage points in the average share of local supplies in Hungary.

### 3.7. Actual or potential local suppliers—the supply side

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Chances of establishing supplier linkages and the quality of these depend also on the size and quality of local businesses. (When comparing Northern Ireland and Ireland, this proved to be the most important factor explaining the different extent of the use of local supplies—Hewitt-Dundas N. *et al.* 2002) For Hungary, company cases were listed (Dóry 1998) where finding local suppliers had been hindered by considerable quantity and quality problems. One major attribute of the Hungarian business world is a lack of medium-sized companies suited technically and financially to supplying large-scale batches with the desired technical accuracy, reliability and timing (Szanyi 2002b). Many of the better-performing medium-sized companies became foreign-owned during the privatization process, as foreign investment was preferred. Most of the remaining firms were weak in many ways (products, markets, finances, management) and eventually failed. Unlike other transition economies, Hungary did not make serious efforts to bail such firms out. So only a few dozen medium-sized manufacturing companies remained to be acquired by Hungarian owners. These have the biggest chances of becoming suppliers, as they can keep up with the quantity and quality requirements of foreign-owned partners. According to Ipargazdasági Kft. (2002B), only 7 per cent of Hungarian suppliers are medium-sized.

This missing layer has also hindered 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 with other countries in the region (such as the Czech Republic), where other privatization techniques were employed. There are a few such companies surrounding Magyar Suzuki (e.g. Bakony Művek and Imag) or Videoton<sup>4</sup> that act as contract manufacturers, 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 established on the ruins of the insolvent large and medium-sized companies are still too weak and unprepared, technologically and financially, to become suppliers. So from the local firms' side, it is the lack of good quality potential suppliers that hinders the development of local supplier linkages with transnationals. It is often medium-sized companies privatized through FDI, or traditional first-tier suppliers of transnationals settled in Hungary that make up the locally acquired supplies.<sup>5</sup> The role of Hungarian companies is in many cases limited to assembly or to supplying first or second-tier suppliers of the affiliates with spare parts, and they are not able to develop their own products, for want of the financial and human resources.

Ipargazdasági Kft. (2002A) reports that many Hungarian suppliers have several customers, supplying electronics and automotive companies as well, using the

<sup>4</sup> Videoton is a contract manufacturer for ABB, Philips, Sony, Matsushita/Panasonic, Kenwood, AFL and others.

<sup>5</sup> According to the business weekly *HVG*, ten of the biggest automotive suppliers had significant production capacities in Hungary in 2001. The presence and expanding production in Hungary of big carmakers (Audi, Suzuki, Opel/GM and Ford/Visteon) acted as a magnet for their traditional suppliers to follow them into the country.

specificities of their plastic or metal products, which can be used for many different end-products. Hungarian suppliers can be marked by smaller series (in some cases one-off products, specifically produced for the buyer), labour intensity and lower complexity, compared with affiliates of transnationals. It is not only the quality, but the quantity of local supplies that potential domestic suppliers cannot offer. This also acts as a hurdle for Hungarian companies becoming suppliers to transnational affiliates.

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 that in total revenues of their suppliers, revenue from one company should not exceed 30 per cent. (Gelei and Nagy 2005, p. 16.) For many domestic companies, this requirement cannot be fulfilled due to a shortage of labour, financial means, skills, *etc.*

### 3.8. The quantity of local suppliers—the demand side

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As a reflection of the previous factor, local companies are induced to make human and financial efforts to become suppliers, if the required quantity ensures profitable returns on the investment. In some cases, the quantity required by one buyer does not reach this threshold, and so the local company waits for other potential buyers to appear in its geographical proximity (taking into account transport costs), before taking steps to become a supplier. Supplying one company may be followed by becoming a supplier for

other companies in the network of the first company, or becoming suppliers for quite different companies. As a next stage, the successful supplier may follow its buyers to other regions inside or even outside the country. (A good example of this is Jászplasztik, which opened a new plant in Nyíregyháza after its main customer, Electrolux, opened a plant there, along with another in Slovakia, just over the border, when a big buyer, Samsung, established an affiliate there—Bakács, Czakó and Sass 2005.)

### 3.9. The size of the affiliate

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There may be another factor influencing the share of local supplies in total inputs of companies with foreign participation. It has been stated (Crone and Watts 2000) that there is a correlation between the sizes of the buyer (company with foreign participation) and of the supplier. Based on case studies from Yorkshire and Humberside, bigger affiliates seek bigger local suppliers, while smaller ones prefer smaller ones. (Similar results were obtained by Barkley and McNamara 1994.) One explanation may be batch size, though it does not explain fully the link between the two variables. In Hungary, this can be one factor explaining the relatively small share of local supplies. Companies with foreign participation in manufacturing are usually larger sized, and so they may tend to seek larger sized suppliers. However, we could not find evidence for this.

### 3.10. The impact of the nationality of the investor

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There are important differences in inclination to use local inputs according to the nationality of the investor. This was shown (Dunning 1986) for Japanese foreign affiliates, and difference between EU-owned transnationals have also been identified (Pearce and Papanastassiou 1997). However, differences also appeared when two British regions were analysed empirically (Crone 2002). In this respect, one can distinguish a “local supplier strategy” among extra-EU, export-oriented (greenfield) investors compared with other investors. These are mostly US, Japanese and South Korean companies established to supply EU markets from a relatively cheap location close geographically to the targeted market or itself part of it. These companies are “forced” to use local suppliers to meet the local content requirements if they want to qualify for the preferential tariff treatment given to exports from Hungary to other EU markets. In many cases they 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 that basically does not fit into the Hungarian economic environment and is export-oriented, but to qualify for preferential tariffs, it had to fulfil local content requirements defined in terms of value added inside the factory and local supplies.

Not only Suzuki but the Japanese first-tier automotive supplier Denso actively sought and found Hungarian suppliers along with some from other EU countries. Denso is rather cost sensitive and therefore continues to seek new, cheaper sup-

pliers, which may mean opportunities for Hungarian SMEs. Denso has also developed a strict multi-level evaluation programme. It starts recruitment with a meeting of some 100 firms in the immediate region. The products are introduced and technical parameters set for the parts that can be purchased locally. Next, potential suppliers make offers that are evaluated. This is followed by company visits by Denso staff. If impressions are positive, sample production is ordered. With more sophisticated products, quality and durability are examined at the Japanese headquarters. The procedure is time-consuming. Once a go-ahead has been received from the lab, Denso visits the supplier again to check equipment, management and finance in the context of regular, reliable delivery at standard quality. Once these conditions are met, a contract can be made if the parties agree on sequencing, quantities, deadlines and price—not usually very high. In fact, low prices are offset by large-scale batches that can make production profitable. Only a few firms have qualified, but Denso believes that suppliers' technology level can be upgraded to the required level through substantial investment in equipment, measuring devices and quality control systems, although no mention is made of active support for potential partners' efforts.

### **3.11. Global strategies of transnational companies**

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The industries most important from the point of view of recruiting local suppliers and exercising substantial spillovers, the automotive and electronics industries, operate increasingly within the production

networks of international partners (Meyer 1998). These international networks, which replace integrated transnationals, are usually dominated by one strong partner and feature longer-term supply contracts. These form barriers to entry into the production network for local firms. Big automotive producers do not outsource the production of parts and components that constitute the essence of their brand. In 2002, big automotive companies were producing about 50 per cent of the content of their cars themselves and outsourcing the rest (Gelei and Nagy 2005). So the key question in terms of the impact of FDI in a transition economy is whether or to what extent companies in the host country can be integrated into these production networks at all. In some cases, even with privatized companies, domestic suppliers can be replaced by global suppliers to the parent company. In others, a domestic supplier that manages to meet the requirements of a local affiliate may become a supplier to other affiliates of the same transnational or to local affiliates of other transnationals. The method of supply organization means an increasing number of Hungarian firms are not supplying the big automotive companies directly, but through their main foreign suppliers. For example, the SME Arge 2000 exports automotive spare parts to the foreign suppliers of car manufacturers of Porsche, Mercedes and Volvo. (Gelei 2006 has more detail on Hungarian automotive suppliers.)

It is important to note that second and first-tier suppliers of the big automotive transnationals went through a merger and acquisition wave (due to the increased and demanding outsourcing activity of carmakers). The global market of automotive suppliers is in the process of

concentration and the number of remaining global players may be fewer than 30. This also has a limiting effect on the potential involvement of Hungarian suppliers. Similar tendencies may be present on the global market of suppliers to the electronics industry.

### 3.12. The affiliates' role in production networks

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The extent of local linkages also depends on the affiliate's position in the transnational's network. Results for Hungary based on questionnaire interviews (Andersson and Forsgren 1996; Vince 2001) showed this with 49 engineering companies and similar results were obtained in another study (Tavares and Young 2006 though their affiliate categories differed from those used in this paper).

Two groups of firms with foreign participation can be distinguished according to their degree of reliance on local suppliers. The first consists of majority foreign-owned companies with tight ownership control, where the owner is a big transnational controlling every aspect of the affiliate. This covers many greenfield investments in Hungary. 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 the viewpoint of industrial economics, 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 mainly provide services. One study (Majcen *et al.* 2003) proved that such assemblers have a very low level of independence in decision-making and simply carry out orders from headquarters, so that they are effectively isolated from the local business community.

In the second group (Vince 2001), the foreign owners of Hungarian affiliates are usually "smaller-sized" transnationals. There are some greenfield investments among them, but most are acquisitions (usually by privatization), where significant changes have been made 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 and have a greater say in their decisions affecting the share of local supplies. So they can be integrated more fully into the local economy and the spill-over effects from their cooperation with local suppliers may be greater. However, affiliates in one category may change to the other, as appears in the case of Italian investments in East-Central and Eastern Europe, and there is a link between the main motive of investment (market-seeking or efficiency-seeking) and the level of independence: usually efficiency-seeking, export-oriented affiliates are less independent than their market-oriented counterparts (Onetti *et al.* 2007).

For affiliates in Hungary, there are big differences in terms of their independence concerning local supplies and local suppliers, and the above links can be traced here as well, to some extent. 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 Hungária) where other factors may

influence the development of local supplies more strongly (e.g. local content requirements for Sanyo). Local supply decisions may be taken first of all by affiliates that have a regional production task, make products exclusively produced in Hungary, or find local supplies more advantageous than imports (e.g. in view of specific transport costs). But on the basis of anecdotal evidence, there seem to be stages in the independence of affiliates. In the first stage, affiliates usually do not take local supply decisions, while in later stages, their local experiences with a few suppliers may lead more scope in choosing others.

### 3.13. What backward linkages mean to a local company

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Becoming a supplier to a transnational affiliate may mean more for a domestic company than the chance to sell products to another company, for there may be additional advantages. Local affiliates of transnationals may contribute to raising the productivity and efficiency of local companies in many ways (Lall 1980): helping prospective suppliers set up their production facilities, providing technical assistance and/or advice on raising the quality of products, organizing and managing production *etc.*, reducing the price or increasing the availability of raw materials and intermediary products for production by helping suppliers buy them (e.g. by organizing common purchase of inputs by a group of suppliers), and helping suppliers to find other customers. Let us look at the case of a Hungarian affiliate<sup>6</sup> operating a large network of

domestic suppliers, and partly for that reason attaining an exceedingly high share of local value added, with certain products over 70 per cent of the total final-product value, and overall of 40–50 per cent—among the highest in Hungary.

The Lehel company, producing refrigerators in Jászberény, was privatized to Electrolux of Sweden in 1991. At the time, most parts and components were produced inside the company and there was a relatively limited network of suppliers. Around 1996–7, production of certain parts and components, not belonging to core activities, started to be outsourced to local suppliers. The technical characteristics of the sector (high specific transport costs of most parts and components) meant that they looked for local suppliers.

This outsourcing process provided the base for establishing a large local supplier network. The process itself was timed relatively “luckily” for the latter: foreign suppliers did not make moves at that time to compete to carry out these activities. The process was helped by a strong local tradition in machinery, metal working and plastics, and related to this, the presence of strong local human and physical capacities. Because the affiliate was relatively independent in selecting its suppliers and because of sector specificities (high specific transport costs, seasonality, need for quick reactions to changes in demand and tastes, and the need to reduce cost of warehousing), this resulted in a relatively large number of local suppliers.

Electrolux Lehel’s active searching for local suppliers continues today. There are elements in the supplier policy of the affiliate that support local companies in becoming suppliers and members of a

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<sup>6</sup> Based on Bakács, Czákó and Sass 2006.

network of suppliers, and even to form the basis of a cluster, and other elements that hinder this. For example, there is technical advice, common purchasing of inputs (so at lower prices), selling of machinery to suppliers during the outsourcing process, and common development and adaptation activities. The last even elevates the relationship between Electrolux Lehel and its suppliers to a higher level. It also helps from the point of view of networking and clustering that Electrolux Lehel requires suppliers to rely on more than one source, namely the share of Electrolux Lehel in the total sales of a supplier cannot dominate. On the other hand, the supplier strategy of Electrolux Lehel demands that there be at least two suppliers of any component or part. The most important factor against networking and clustering is that for reasons of competitiveness, Electrolux Lehel concludes supplier contracts for relatively short periods.

#### **4) ARE SUPPLIER NETWORKS A GOOD BASIS FOR CLUSTER DEVELOPMENT?**

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Transnational corporations are desired participants in clusters (Sölvell *et al.* 2003), who may support their development in several ways. They are in direct contact with world markets and can potentially bring fresh news to the cluster at first hand. Their widespread international linkages mean they can support the international activities of the cluster and of smaller cluster members. They may even lobby for their partners' interests. Another potential support area is technol-

ogy. Transnationals usually have the latest technology and can offer technology and knowledge transfer to strategic partners. In fact such transfers and enabling policies are common in stable supplier contacts. The intensity of such linkages depend much on their level of inclination to develop a supplier network, which along with nationality and a global strategy, is perhaps the strongest determinant. Another technology-related area is R and D. One of the essential cluster functions, especially in dynamic clusters, is knowledge generation and distribution within the cluster. Should there be intensive R and D linkages among cluster members, including research institutions and universities, it is likely that transnationals will also participate in the collaboration. Akin to knowledge generation is training and education. This is also based on cooperation among heterogeneous partners, including transnational companies.

It has been seen that large international firms can play important role in many important cluster functions. The large survey of international clusters made in 2003 survey (Sölvell *et al.* 2003) identified transnationals as important players. But developed market economies were heavily overrepresented in that survey. Patterns of cluster development have been found to be different in emerging market economies (Ketels *et al.* 2006). The first major difference is in perceptions of the role of clusters. In developed countries, they are treated as an important tool to spur the innovation process, but economic policy in developing and transition economies regards clusters as tools for other policy purposes such as regional development, foreign investment attraction, or SME development. The other main difference was found in levels of social capital. While developed coun-

tries' clusters spend much energy on building up trust, this function is regarded as precondition for any cooperation in clusters in the transition economies, where there is an acute, overwhelming lack of trust and of entrepreneurial culture and experience in long-term cooperation. Moreover, frequent changes in economic policy and institutions result in low levels of trust in governments, and in the dominance of short-term business considerations over longer perspectives. These factors thwart cluster development and provide different emphasis for cluster activities. A low level of trust among cluster members (especially SMEs) does not support cooperation on strategic levels, as for example joint R and D projects. Much more emphasis is given to simpler functions such as joint marketing or procurement, lobbying or training. These specificities belong in discussion of the potential role of supplier networks in cluster development.

Three questions need analysing in order to see the potential role of transnationals and their partners in cluster development. The first issue is whether transnationals are even interested in developing the local business contacts discussed in the previous section. The next problem, dealt with in the main part of this section, is whether transnational-integrated supplier networks are suitable for the development of clusters. The third question is whether transnationals are 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 attracts all transnationals.

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 transnationals, although many possess strong innovation communities that could potentially serve as knowledge-generating networks of international importance. So transnationals' interest in developing deep cooperation networks, including participation in clusters, is weaker in emerging market economies than in developed countries. Yet as with conditions for developing supplier networks, cluster participation is plausible and desirable, albeit the likelihood and modes of participation may vary greatly. The next section compares from the transnationals' point of view the conditions for supplier network development with those for cluster establishment. This comparison highlights possible ways of organizing clusters based on existing supplier transnational networks.

#### **4.1. Ways to develop supplier networks and their cluster-forming potential**

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In general, factors increasing the likelihood of supplier network development are likely also to increase propensity to cluster involvement. But the two are not identical, and in some cases interests may substantially differ. So it is necessary to consider these determinants also from the cluster viewpoint. They are as follows: spatial concentration, specialization, heterogeneity of actors, simultaneous competition and cooperation, critical mass, and typical cluster activities.

As far as geographical concentration is concerned, it can be seen immediately

that the main areas for FDI in Hungary are identical to those of intensive cluster development: the capital city, and the Northern and Western Transdanubia regions. In fact investments started to form pronounced agglomerations in the 1990s, while cluster development (formal cluster initiatives) started only after 2000. The causal relations are rather unclear, as these regions used to be fairly developed industrial centres before the transition period, and their production potentials contributed greatly to their ability to attract FDI. Later this potential was further strengthened by the transnationals themselves. Leading OEMs attracted their traditional suppliers to invest in the same region 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 a vicinity. OEMs also exercised strong pulling effect on local suppliers. While many had their premises in historic industrial districts, new firms also settled into them. This process was reinforced by some policy measures. For over a decade, special industrial zones enjoyed privileges in the form of tax and customs relief, provided they exported their whole output. Tax-free zones became hubs for greenfield investments that also incorporated many Hungarian suppliers (Antalóczy and Sass 2001).

Much of the export-oriented greenfield investment was carried out in the tax-free zones, but it also has to be said that some 100 such zones were created, since regulations for establishing them were quite easy to meet. So the likely pattern of spatial concentration was one OEM and its traditional first-tier suppliers, with local second and third-tier supplier companies. Only on rare occasions did OEMs with similar final products set-

tle in the same hub. They tended to distance themselves from competitors and to prefer distance from their supplier network as well (Szalavetz 2001).

So significant concentrations of specialized firms were created in Hungary's more developed areas. These consisted of technologically dependent suppliers of the value chain of single OEMs. The types of cooperation also helped the chain to function smoothly. 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 transnationals, but also linkages among suppliers (for example in the case of Electrolux). There is some evidence that transnationals 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 transnationals 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 an-



other 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, transnationals in many of the privatization cases were not interested in 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 heterogeneity of members. It is clear that supplier networks around transnationals serve mainly the business interests of the integrating company. Anything beyond that must be initiated by other parties. Day-to-day interests of transnationals are simple: to run their production facilities smoothly and efficiently (many of them are efficiency-seeking). They need reliable business partners in the value chain. But especially in the early years, they do not care much about the broader background. Many transnationals regard investment projects as one-off deals that last while favourable conditions prevail, but need not involve longer-term provision of such conditions. So institutions in the broader production background (education, infrastructure development, *etc.*) remain out of their line of vision. Early-phase local production networks usually lack the diversity that is an important feature of clusters.

The situation changes with the age and development of investment projects. There is much empirical evidence to show how even greenfield investments changed their nature and behaviour (Szanyi 2003; Hunya 2001). For it is in their own efficiency-seeking interest to tap cheap opportunities in almost the whole value chain. So they expand activity from final assembly of imported parts to increasing local component supply and participation in corporate functions (from accounting through logistics even to R and 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 or "offshore-ing" much of the activity (Sass 2008). The more activities carried out locally the likelier it becomes that business and cooperation links will develop in various directions that go beyond mere technological cooperation among suppliers. Whenever there is more room for contacts among heterogeneous market actors, potentials also increase for organizing these contacts and actors in formal ways. The clustering process may also begin from the bottom up.

So-called integrator companies may play a big role in clustering. Gelei (2006) terms "network competence" the ability to manage a whole supplier network, so as to produce a complex supplied product. This type of company collects lower-level suppliers round itself, coordinates their activities, and cooperates with them in product development, according to buyer needs. The joint activities form a good basis for deepening cooperation, possibly into a cluster type. The foreign-owned affiliate acts as a catalyst—not an active participant in a cluster, but a generator of one. (Anecdotal evidence of this type

of cluster in Mexico appears in Arroyo-Lopez and Bitran 2007.)

Recent experience with labour shortage in some industrial bases in Hungary opened up new frontiers of cooperation with transnationals. National Instruments in Debrecen, Siemens in Budapest, Nokia in Szeged and Audi in Győr are just four examples of transnationals participating in the shaping and financing of university education programmes. Of course they do this because they need more high-quality labour. Another welcome development pattern is increasing transnational participation in financing and in part carrying out R and D projects in Hungary. Some leading investors have established R and D laboratories in the country. This also increases substantially the clustering potentials of some cities, where sufficient educational and innovation background is present. But it is not thought that dynamic clusters will soon play any major role in Hungary's economic development. It is good if transnationals at least realize they may also benefit from cluster cooperation here, and become active members of clusters. Yet the fact that universities, R and D facilities, and maybe other actors have aroused their interest also supports the cluster idea and increases the chances for proper cluster actions.

With the coexistence of cooperation and competition, Hungarian clusters may play positive role. Transnational supplier networks have always supported intensive competition among local firms. Cooperation has been rather lacking, although it is very much in the interest of local firms to improve their ability to act jointly instead of singly. Clusters may play important role in organizing various programmes for development of participating SMEs. This is also in the interest

of the transnationals heading the value chain. Other forms of cooperation, above all in technology and knowledge transfer or even generation, is also plausible in supplier-based clusters, especially if members can change their way of thinking about vertical flows, but recognize there is also room for joint horizontal action. Empirical evidence indicates that this is the most difficult task of cluster managers, as many potential members are competitors for contracts of the top OEMs or first-tier foreign suppliers. Finding ways of interesting transnationals in cluster cooperation is sometimes no more difficult than trust building among competing local suppliers.

As for the critical mass of clusters, there is very little information on this in Hungary. Empirical surveys show that formal cluster organizations do not set such targets. Many are in an early stage of development, so that the question is not yet relevant to them. Yet some general conclusions can be drawn, using published guidelines (Sölvell 2003; CLOE 2005). Achieving a critical mass is important for three reasons: stability (against potential dropouts of large, dominating firms), self-sustaining (financially and in new entry attraction), and information flow and activity (a kind of density of cluster actions that provides the desired synergies). Transnational supplier networks alone have little chance of attaining these goals. Membership of competing OEMs is unlikely. Still, there may be clusters that are not initiated or dominated by OEMs, but established by other parties, building on suppliers to transnationals. In this case, the attribute of use is the initially favourable condition of the supplier network—that there is a pool of potential cluster members. Using this pool, a cluster can be organized with or

without participation by the transnational itself. A good example of this is the Pannon Automotive Cluster (PANAC), Hungary's oldest and largest. But even this cluster was unable for many years to differentiate activities away from simple supplier-network development. It took time and some setbacks before the cluster management realized that proper functioning could not be based solely on supplier network development programmes (Grosz 2006). Representing the cluster's own interests as a separate organization is crucial, and cannot be subordinated to one firm's business interests. Furthermore, professional cluster management must be used, so that regular cluster functions are developed.

#### 4.2. Policy relevance and empirical evidence

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Clusters and cluster policies started to evolve only eight years ago, yet there are already some empirical surveys of cluster development in Hungary. Gecse (2004) provided a list of 22 clusters for the year 2003. At least half of these had some strong transnational participation, mainly in the field of the automotive and electronics industries (branches targeted by FDI attraction policy). When comparing this list with the most recent one by Szanyi (2008), it can be that only 10 of the 22 mentioned still operated in 2007. All the others had disappeared. Of the survivors there were some transnational-oriented clusters like PANAC, the showcase automotive cluster. 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 had not attained the stability to provide critical mass. Furthermore, PANAC had to change philosophy and some activities after a major crisis in 2004–5 that led to a drop in membership. The new action plan concentrates on “new” areas of cluster development like adjusted procurement policy and joint marketing actions, or organization of a general assembly of members. Management realized there were general features and functions of cluster organization that were vital especially for SMEs, but neglected by the previous management. More balanced cluster management activity soon turned the tide and PANAC regained momentum.

To replace the failed organizations, much new activity started especially in 2005–6 with the introduction of new cluster promotion schemes by economic policy-makers. But again, many of the grant-winning clusters showed no signs of still being proper clusters a year or two later (Szanyi 2008). Failed clusters were not usually bound to major transnationals. So it can be concluded that cluster organization has a rationale where there is transnational involvement, whereas many cluster organizations of local SMEs are only virtual clusters looking for subsidies. Nevertheless, clusters with transnational participation may also be fragile. This is the case where general cluster functions are underdeveloped, especially if activities are in a horizontal direction and no collaboration is developed among SMEs and other cluster members (universities, research laboratories). Unfortunately, transnationals are in some cases not interested in the development of horizontal cooperation links. They would rather see their suppliers isolated, not setting up a joint interest platform that may also increase SME bargaining power.

The two questionnaire-based surveys of Hungarian clusters (SEED 2003; Netwin 2007) again proved that Hungarian clusters showed rather weak internal cooperation focused mainly on establishing the cluster organization, less on activities essential to cluster members. Both papers raised concerns about the efficiency of cluster-development policies and called for action. The grants for cluster support should be awarded competitively rather than on a normative basis, and the use of the grants should be controlled over the project life span. Another proposal was for the establishment of a cluster accreditation system to provide transparent and relevant qualification requirements. Such an accreditation scheme was introduced in 2008, with strong emphasis on innovative measures. This means the Hungarian government has followed EC guidelines and made cluster policies a tool of innovation policy. There is a danger that this new emphasis will shift attention from general cluster attributes again: the cluster is not supported for its own sake, but to promote other, superior policy targets.

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