

DISCUSSION PAPERS

No. 52

**Clusterisation Processes
in the Hungarian
Automotive Industry**



**HUNGARIAN ACADEMY OF SCIENCES
CENTRE FOR REGIONAL STUDIES**

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OF HUNGARIAN ACADEMY OF SCIENCES**

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**Clusterisation Processes
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Automotive Industry**

**by
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1 Introduction

During the past few years the interest for regional clusters and for their role in economic development has grown to an extremely high level both in science and in the community of economic development expertise and business operation managers. This continuously growing attention is originating from the tough competition both on regional and international level in the globalising world economy, from the disfunctioning of traditional regional development models and regional policies and also from the emergence of successful clusters in different enterprises and industries worldwide. As a result of getting into the focus of attention the rise and penetration of cluster-based economic policies is seen almost everywhere in the world and on the other hand a real explosion is going on in the literature of regional clusters and regional clusterisation.

At the beginning of the 21st century the major centres of world economy are consisting of such areas where companies, suppliers, institutions, universities and state organisations working and cooperating within the same sector are creating a critical mass and their close cooperative relations are granting competitive advantages in the international competition of the globalising world (*Lengyel, 2000, 2001; Lengyel–Buzás, 2002; Lengyel–Deák, 2002, Porter, 1990, 1998, 2000*). These regions having recognized in due time that economic growth can be achieved by successful economic restructuring, modernisation, by building cooperative networks and regional clusters instead of the implementation of the traditional sectoral model of industrial policy (Upper-Austria, Baden-Württemberg, Bavaria, Finland etc.) could gain significant competitive advantages in global competition (*Bergman–Feser, 1999; Boosting innovation... 1999, Enterprise Clusters and Networks 2002; Rosenfeld, 1995, 2002*).

In Europe's economically boosting countries – as well as in overseas areas – concentrated cooperation systems are getting into a key position during the organisation of regional economies. Owing to this fact several hundred clusters have been registered worldwide (*The Competitiveness Institute 2004*). During the past decade several initiatives have been established for gaining advantages from clusterisation in several countries of Europe such as Austria, Germany, Denmark, France or Finland. Due to their success more and more information is heard on the formulation of new regional and industrial clusters and their governmental support (*Nikodémusz, 2002; II. Országos Klaszter konferencia 2003; Grosz, 2003; Lengyel–Rechnitzer, 2002*).

During the past few decades for adapting industrial clusters to the requirements of the global market and for increasing their competitiveness industrial clusters have developed into one of the most essential instruments of economic development policy and for some years – due to the relatively easy localisation of their geographical dimension – they have a vital role in regional development, i.e.

the implementation of regional policy as well (*Dőry, 2005; Dőry–Rechnitzer, 2002; Lengyel–Rechnitzer, 2004; Rechnitzer, 1998; Steiner, 1998*).

Today in almost all segments of socio-economic life the role of networks consisting of different companies, organisations, institutes are highly appreciated. Due to the rapid development of the Internet and other communication channels the maximal utilisation of the potentials of tight cooperation systems has an extremely high importance. Since the 1990s cluster-oriented development, one of the most definitive instruments of economic development, has been targeted at the deepening and intensification of cooperation among different enterprises working within the same industrial sector or value chain (from SMEs to large multinational firms), private and public research and educational institutes, economic and regional development organisations and other firms rendering various services and also at launching and financing common research projects.

The author of this paper is going to investigate and follow clusterisation processes in the field of Hungarian automotive (car and car part manufacturing) industry having traditional fundamentals in Northwest-Hungary but the emergence of foreign direct investments and the specialisation of automotive services accelerated its development process during the past ten years. The investigation of the clusterisation of Hungarian automotive industry raises the following questions:

- What are the major features of the spatial concentration of automotive industry in Hungary?
- At which phase is the clusterisation of automotive industry now?
- What factors are fostering the clusterisation of this sector within the region?
- What factors and processes are hindering the transition of clusterisation process into a new phase?
- How can the clusterisation of the Hungarian automotive sector be integrated into international but most of all into the East Central European clusterisation processes?

The empirical research of regional and industrial clusters and clusterisation will be based on the very strong cooperative ties between motor vehicle manufacturing and its satellite industries (i.e. automotive industry) and their essential background supply services, R&D capacities and the different actors, organisations and institutions directly involved in the development of this sector.

My selection of the automotive sector is motivated by two reasons. The first is, that due to the automotive industry's dimensional features, characteristics and structure, its claim for a high-tech supplier industry, the wide circle of its industrial and servicing linkages and its need for continuous R&D activities originating from globalisation-based intensive international competition, the major features of clusterisation may easily be identified in automotive industry. The technology

applied within this sector and the major trends of the past ten years are clearly verifying the fact that the importance of regional and industrial clusters will further increase and they will be the key factors of the efficiency and success of automotive industry. The second reason of my choice of the automotive industry is explained not by general or global tendencies but rather by Hungarian processes. One of the major consequences of the economic restructuring in the period after the change of regime was the dynamic development of engineering industry, namely motor vehicle and car part manufacturing. The regional concentration processes, the dominating features of clusterisation, may clearly been identified within this sector. In the history of Hungarian clusterisation Pannon Automotive Cluster seated in Győr may be regarded as one of the most successful initiatives.

2 Clusterisation process and the cluster as a development instrument

As a summary of the different terms and approaches of clustering highlighting its common features, we can conceptualise clusters as a spatially concentrated cooperation system of competing and cooperating independent economic actors (business enterprises) and non-profit institutions, organisations (institutes of higher education, research institutes, professional associations, development agencies etc.) organised on a line of industrial sector or value chain that may significantly increase both the actors' and their whole region's competitiveness level. This definition is surpassing the simple network approach of horizontal relations manifesting through the various cooperation activities of business enterprises within the same market and industry (e.g. common acquisition, R&D, marketing and sales policy). This is rather more an intersectoral system, a network of business enterprises of different or complementary activities organised along a special link or knowledge bases of a value chain.

The term cluster has double meaning in the relevant literature: this word describes a process (clustering) and its 'final product' (cluster) at the same time (*Grosz 2003a*). Thus, during the analysis of the model of clusterisation its process and timely features should not be neglected. Starting from the term cluster clusterisation process may be interpreted as a spontaneous, in the majority of cases self-sustained socio-economic development process running in several sub-periods resulting in the above-mentioned territorial cooperation on the basis of wide range of cooperation and synergies and the participants may benefit all of the advantages of this cooperation structure. Just to mention some examples for the spontaneously starting clusterisation processes: film industry in Hollywood, gambling in Las Vegas, financial services in New York, London and Frankfurt, car

industry in Detroit, software industry in Silicon Valley or the intensive concentration of traditional handicraft industry in Northern-Italy.

In fact the formation and evolution of new regional clusters and clusterisation itself are slow processes, sometimes lasting even for several decades having some general phases and development stages in the majority of cases. An observatory study on regional clusters has identified six common phases which according to a publication of the European Commission can be summarised as follows (*Regional Clusters in Europe 2002*).

Naturally, these development phases are theoretical they have been formulated on the basis of the similarity of development trends and structural changes in the majority of clusters. This means that in reality the development of a cluster does not necessarily follow these phases closely but may be stimulated by similar driving forces (*Figure 1*).

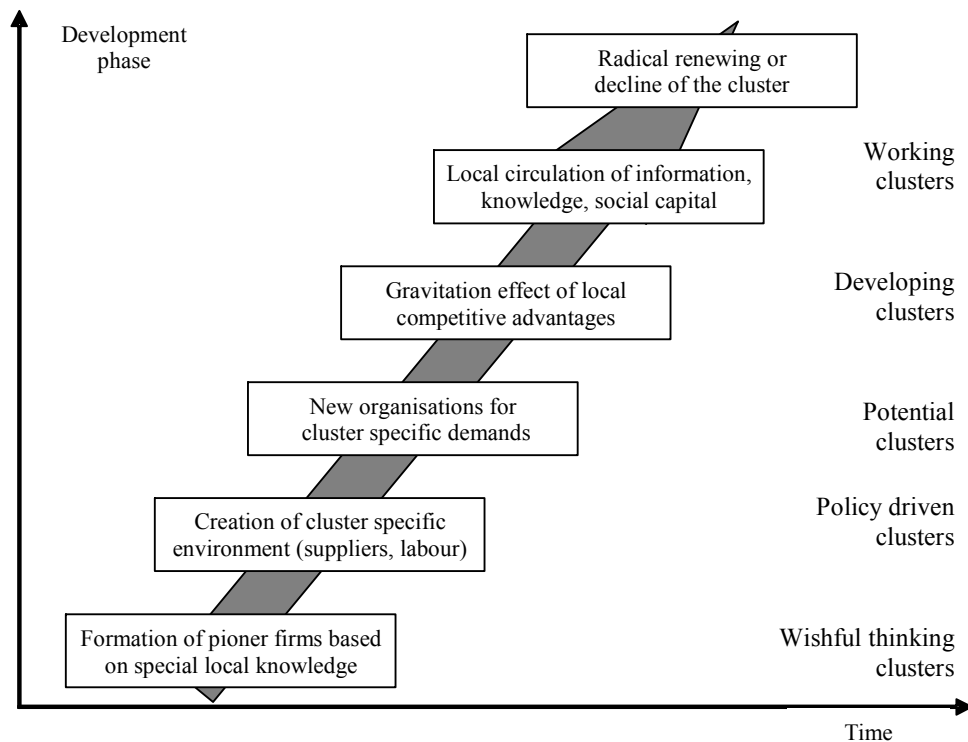
- The first phase which could be defined as the period of pioneer enterprises is characterised by the emergence and foundation of new business organisations. During this initial stage several new enterprises standing on the grounds of a special local knowledge basis are founded on the territory of a certain region. Characteristically, they are followed by several spin-off enterprises.
- The second phase is the evolution of cluster specific environment when the increasing concentration of business organisations is attracting a growing number of special supplier and service provider businesses. This is creating a cluster-oriented intermediary and supplying industry formulating the secondary level of clustering consisting of a network of supporter companies. The concentration of businesses also contributes to and promotes the formulation of a special labour market standing on the basis of a large-scale but competitive and well-trained labour and their rotation will ease the information flow among the participant firms as well.
- During the third phase the further development of clusterisation generates new organisations or institutions to assess the specific demands of clustered business organisations and on the basis of demands they provide specific services through creating the necessary local preconditions of competitiveness. The physical infrastructure of clusterisation is gradually being set up.
- By the recognition and for gaining profit from the advantages of this milieu the cluster has a strong gravitation force on its local environment. This makes several non-clustered businesses to join the cluster and relocate their site into the cluster ‘dominated’ region which besides attracting external firms is still an ideal place for the foundation of new enterprises. Besides attracting new enterprises the cluster’s gravitation force is manifested by the

mobilisation of highly qualified, specifically trained professional labour force.

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- The fifth phase of clusterisation is the period of establishing a non-market based relational capital between clustered enterprises and various non profit oriented organisations and institutions to facilitate the local circulation of information and knowledge.

Figure 1

The different phases of clusterisation process



Source: The author’s own edition on the basis of Regional Clusters in Europe (2002).

- And finally as in case of life cycles and life diagrams (product life cycle, corporate life diagram) clusters also have a breakdown period which does not necessarily mean the total failure or closedown of clustered enterprises or the termination of the cluster itself but rather a stagnation period when both the key sector and of the operation method of clustered enterprises, organisations and institutions need radical changes for sustaining of their competitiveness on the long run.

Naturally, if a cluster is unable to meet these challenges its regression or termination is unavoidable. At the same time there are several examples in everyday life when a cluster was able to respond the challenges by radically transforming the economic profile of its enterprises and by restructuring its institutional relation system between its enterprises and their various satellite institutions and organisations, i.e. was able for reclusterisation just as in case of the renewal of the Swiss watchmaker industry responding to the challenges of East-Asian digital watch industry, or in case of the transformation of Detroit car industry after the decline of the fordist paradigm, or in case of the restructuring of the machine tool industry in Baden-Württemberg with the emergence of electronic chips (*Tichy, 1998*).

Lengyel agrees with Berg-Braun-Winden on the cyclical nature and a kind of life cycle approach of clusterisation in the Hungarian literature (*Lengyel, 2002*), which starting from critical mass emergence following through specialisation, the launch of knowledge overflow and through the formation of a clustered structure enables the enterprises of cluster to enter the market with high quality products and services. This process definitively strengthens clusters, creates new enterprises and extends the corporate system of the existing actors. Lengyel is on the opinion that the life cycle of clusters is determined by the life cycle of their key product and their applied technology and by the radical changes in their adaptation to the external market conditions (*Lengyel, 2002*). On the basis of these criteria Lengyel reduces the number of the above-listed six development criteria to four: (1) embryonic or initial phase; (2) growth or development phase; (3) mature or advanced phase; and finally (4) declining phase.

Depending on the current phase of a clusterisation process, on its critical mass (corporate, service and institutional), on the intensity and scale of their interrelationship, on the degree of positive externalities and synergic effects of clusterisation Enright defines different cluster types on the basis of their development level correlating to some extent with the above-mentioned phases (*Figure 1*) (*Enright 2001*):¹

¹ Buzás has a similar categorisation of clusters according to development level but he uses these terms in a different way. He adds the notion of latent cluster to the categories of operating, advanced and potential cluster. He interprets it as ‘*the availability of economic actors is sufficient*

- *Working clusters*: These are clusters with enterprises that do have all the critical mass of local knowledge, professional expertise, specialised labour force and agglomerative advantages granting competitive advantages for them against those enterprises that are not participating in a cluster. Operating clusters are based on the common knowledge of local competitors, suppliers, customers and institutions cooperating within the cluster. The participants of clusters are generally competitive in international markets too. Advanced clusters have high R&D potentials and innovative skills (Buzás, 2000).
- *Developing clusters*: These are clusters that do have the critical mass of enterprises within an industrial sector enabling them to benefit from certain advantages of clusterisation but the intensity of cooperative relations and information circulation within the cluster is too low for benefiting the real advantages of clusterisation deriving from its geographical concentration. Although developing clusters do have their own R&D capacities and infrastructure they are insufficient yet for granting success for the cluster and its enterprises. The reasons of underdevelopment may be explained by several factors: insufficient professional knowledge at the majority of local firms, the absence of interaction between enterprises and persons, the absence of a common vision for the future or the unwillingness of participating enterprises to find a common basis of interest or to make use of the common motivations.²
- *Potential clusters*: These are clusters that do have the majority of or several elements and factors necessary for the formation of a successful cluster but these elements should further be improved and enhanced to achieve positive agglomerative effects. In Buzás' opinion mostly the initial steps should be made at this stage and the actors have not yet recognised the potentials of clusters that may increase the competitiveness of their business or their own region (Buzás, 2002).
- *Policy driven clusters*: These are clusters having been created by the central or regional (federal) government either for generating or catalysing clusterisation process on the basis of critical mass or local knowledge through an organic development process. Policy driven/created clusters are rather such kind of initiatives to be formed with the aim of launching a clusterisation process and those operating and developing clusters having been

for formulating a cluster but due to the absence of a real driving force there is no real need for the establishment of cluster, thus the economic sector does not exploit its potential capacities' (Buzás, 2000 p. 116).

² Enright used the term 'latent clusters' (hidden, smouldering) for the group of developing clusters but in my opinion the term of Buzás (Buzás, 2000, 2002) would be more suitable as it reflects the current state and development of the clusters of this phase more precisely.

achieved significant results through their organic and independent clusterisation do not belong to this category. Policy should only provide support and an adequate environment for their development.

- ‘*Wishful thinking clusters*’: In most cases these are policy driven clusters lacking not only the critical mass needed for clusterisation but other elements or factors as well that would contribute to organic development. In case of wishful thinking clusters the chances for starting up a real clusterisation process are very low.

However, this kind of clusterisation apart from economic actors may be facilitated by special political measures and instruments. Therefore, regional and industrial clusters are not only cited and interpreted in professional literature but clusters and cluster-oriented development are more and more often used as instruments of regional development, business development and comprehensive economic development. In the USA and West-Europe network and cluster-oriented economic development with the promotion of clusterisation are one of the most dominating economic development trends since the 1990s because they want to facilitate the intensification of cooperation among different enterprises working within the same industrial sector or value chain (from SMEs to large multinational firms), private and public research and educational institutes, economic and regional development organisations and other firms rendering various services and also at launching and financing common research projects.

It may also be observed that for the facilitation and acceleration of clusterisation central government organisations or even regional actors preferably establish a special organisation, institution in a concrete corporate formation. This organisation is responsible for the establishment of an efficient partnership system within a cluster through providing special customised services to the needs of the industry, sector or value-chain by improving communication and the local circulation of knowledge and by catalysing synergic effects. To achieve these targets the Automotive Cluster Vienna Region defines its corporate structure and task as follows: ‘The Automotive Cluster Vienna Region (ACVR) is a network of such innovative companies whose activity is related to the novelties of transport and motor vehicle technology. ACVR through its initiation of cooperation and launching projects is facilitating and contributing to the cooperation of firms participating in the growing market of automotive industry. With its comprehensive information, marketing and cooperative services ACVR provides a background assistance for firms enabling them to fully concentrate on their primary activities’ (ACVR 2004).

As a general rule, the profile of these organisations may vary depending on the special features of the region, industry or value chain they are embedded into. They may also differ by the development phase of their clusterisation process.

They may be labelled in several ways, either as technology centres or regional innovation agencies or competence centres and similar tasks are performed by different business promotion organisations, foundations and federations. In several cases these new foundations are established within the corporate framework of a competent regional development, economic development or business development organisation and have been labelled as 'clusters' nowadays. Only within the automotive industry sector several such organisations have been operating all over Europe such as: Automotive Cluster in Wales, Automobile Cluster Oberösterreich, Automobil Cluster Styria and the Automotive Cluster Vienna Region (*Grosz, 2000*).

During the past years following West European examples but mainly Austrian patterns several clusterisation initiatives have been launched (among others) in the following sectors: automotive industry, wood and furniture industry, electronic industry, meat processing industry, mechanotrics, thermal tourism, fruit processing, building industry environmental technology etc.), and they also propagate themselves as 'clusters' and in the majority of cases they are linked to a regional development and business development organisation or to a leading enterprise or entrepreneurial group of an industrial sector. The demand for the development of clusters as instruments of successful economic development is represented in almost every Hungarian region's regional development programme and also is a part of the Hungarian government's economic development concepts.

Although rather rough and diverse interpretations exist for clusters, their common dimensions – geographical proximity, the cooperative relations of firms, institutional relations, individual competence and their associated intensive specialisation and labour division may unambiguously mark out such a theoretical framework that enables clusters and clusterisation to be interpreted as an economic model trying to describe a certain economic ecosystem. Besides their economic modelling function, clusters and clusterisation as economic development, business development and regional development instruments also have vital importance. In this case a cluster is backed up by an organisation or institution having its own objectives and priorities, functioning as an independent organisation with its own management, in several cases with the mission of catalysing the transition process of clusterisation from one phase to another.

Clusterisation may be characterised as a long-lasting, automatically starting and self-sustaining process consisting of different phases depending on the extent and intensity of interactions among participants, on the sophistication degree of labour division and on the complexity level of specialisation. The application of cluster as an economic model in the paper determines those dimensions that can serve as a basis for the evaluation of the clusterisation of Hungarian automotive industry. For this reason our empirical survey will focus on the general research

criteria of clusters: the degree of their geographical dimensions, the density of business organisations, the intensity of horizontal and vertical relation system, the activity scope, the development level, the ownership structure and the innovative capacities. On the other hand the research field marked out by the competitiveness determinants of the Porter rhombus model, i.e. the general and special factorial conditions of the global competitiveness of the concentration of Hungarian automotive sector, the conditions of market demand, the intermediary and complementary industrial sectors with corporate strategy and competition and all qualitative processes hindering or even stimulating and promoting the clusterisation of automotive industry.

Corporate networks have definitively a leading role in clusterisation as their typological character depends on the number and role of participants, on the direction, intensity and target of cooperative relations. With a smooth transition from simply profit-oriented, narrow, hard networks through the open long-term target oriented soft networks leads the way towards clusters.

Clusterisation may be influenced by political instruments and measures; both the ignition of clusterisation and the transition process between the different phases of clusterisation may be stimulated and accelerated. Clusters may develop only through the application of cluster policy coupled by a decentralized decision system. For this reason during the application of regional development policies demand regulated cluster-oriented development is well recognisable, and it is featured by cluster-based approach, high degree of decentralisation, the minimisation of the central state's role, the dominance of local actors and the promotion of bottom-up initiatives. This cluster-based economic development is significantly differing from the traditional sector-based model considering its objectives, applicable instruments, intervention areas and directions.

At the same time, it should be taken into account that cluster-based approach, cluster-oriented policy and its instruments are typical only for the regions of advanced socio-economic development, and their direct adaptation is not applicable for underdeveloped, lagging regions and countries but in all types of regions the synchronisation and balance between inter-firm cooperation and competition, the basis of economic development, is a key issue.

3 The automotive industry as a cluster forming sector

The history of today's cars looks back to a 200 year history. The 'horseless carts' of the 19th century changed into motor vehicles equipped with the most advanced technique and technology. The safety and the economic petrol consumption of our cars are guaranteed not only by car manufacturing and its supplying industries but also by the latest technologies of electronic and computer industry and sometimes even by space research and armaments industry as well.

Due to its demand for an extensive supplier network automotive industry is a leading economic sector of some national economies, its role in world economy and its worldwide relations makes it one of the most profitable 'enterprises' of the world. During the mid-1990s only in the European Union automotive industry provided 1.9 million jobs in car manufacturing sector and 950,000 in car part manufacturing. In other industries being in a direct dependence from automotive industry (transportation, commerce, insurance) the number of employees was 8 million. The extreme importance of motor vehicle manufacturing is proved by the fact that six per cent of the employees in the European Union's processing industry are working in this sector but its share from the total output of processing industry is higher making up to seven per cent. Just like in Europe the number of directly employed in the automotive sector is 6.6 million: this is 5 per cent of the private sector. The share of automotive industry from total employment in the European Union, the USA and in Japan is nearly 1.5% and its weight from the total GDP is estimated as 2% (*European Competitiveness Report... 2004*).

If following Nefiodow's advice we extend our research to all sectors involved directly and indirectly in the automotive sector we can see that its weight is even greater, because as an intermediary sector it has a major role in chemical industry, plastics industry, electronics, steel industry and also in transport, transportation or even in commerce and other financial services (*Nefiodow, 2001*). As the compilation of a car requires about 10-12 thousand components, this sector's development affects several other sectors, practically it has major impacts on the development of the whole economy. Car manufacturers are among the largest purchasers of aluminium, copper, iron, steel, lead, plastics, rubber, textiles, electronic components (e.g. cable bundles).

Due to globalisation and the changes in the economic paradigm of the past few decades fundamental restructuring processes have taken place in different industrial sectors having an influence not only on final product manufacturing firms but their suppliers' network as well (*Analysis of Transnational... 1999*). These trends are more relevant for vehicle industry. Global final product manufacturers, the famous worldwide big car manufacturer companies are under a constant pressure of cost minimisation and innovation. This pressure is originating from the side of consumer demands and expectations as consumers always seek for better and

cheaper products they previously had. Car manufacturers are trying to beat these challenges and their increasing R&D costs by an increasing volume of car production. To achieve that they continue the concentration process starting from the creation of a strategic alliance system following through a common agreement based fusion process until the acquisition of competitors. The number of independent car manufacturers reduced from the value of 60 in the 1960s to the value of 17 by now and car industry professionals do not exclude the possibility that in a few years' time only 5–10 big car manufacturers will remain in the market. Where have the hundreds of US small car manufacturers of the early 1900s gone?

Naturally, significant cost reduction in car manufacturing may be achieved only by a partial transferring of the car manufacturers' load onto the back of car suppliers. This means the extension of R&D for the whole production line. Not only the demand for significant curtailment of costs but also the quality improvement of products does require full optimisation on the whole vertical line of suppliers (starting from raw material manufacturers, continuing with component part manufacturers and system suppliers until final product manufacturers). Despite automotive industry may not be considered a high-tech industrial sector, 20% of industrial R&D activities is closely bound to the automotive sector. This figure is 30% in Germany a dominating country of the automotive sector (*European Competitiveness Report... 2004*). The processes of the past decades radically increased the competition among suppliers, narrowed the pyramid of suppliers and also reshaped their structure.

The present well-functioning partnerships are undergoing a change, new strategic partners are needed and in several cases car part related industries are running separately or partly independently within the car manufacturer's corporate organisation scheme. The independent running of car part business within car manufacturing process has resulted in a continuously increasing share of goods acquisition from external suppliers.³ The top manufacturers' cooperative ambition is shown by lowering the number of direct primary suppliers but this is reshaping the whole corporation structure scheme. It may clearly be seen that suppliers capable for the delivery of complete, systemised car part packages (system suppliers) (e.g. complete brake or air conditioning systems) are enjoying preferences in selection. Due to the fact that the lower levels of the vertical cooperation chain are also heavily loaded with complex tasks the firm's intellectual and technical de-

³ In Germany all car manufacturers have increased their acquisition share from external suppliers during the past few years and at the same time they were continuously reducing the output volume of main and part modules on their main assembly line system increasing in this way the share of external acquisitions to a value of 55–60%. General Motors created an independent organisation from its Delphi car part branch operating with 30 billion USD sales revenue and Ford Company underwent a similar procedure with the incorporation of Viston, a company with a branch in Hungary, into an independent organisation.

velopment capacities and potentials, therefore the availability of adequately trained labour, i.e. human resource factors have key importance here (*Analysis of Transnational... 1999*).

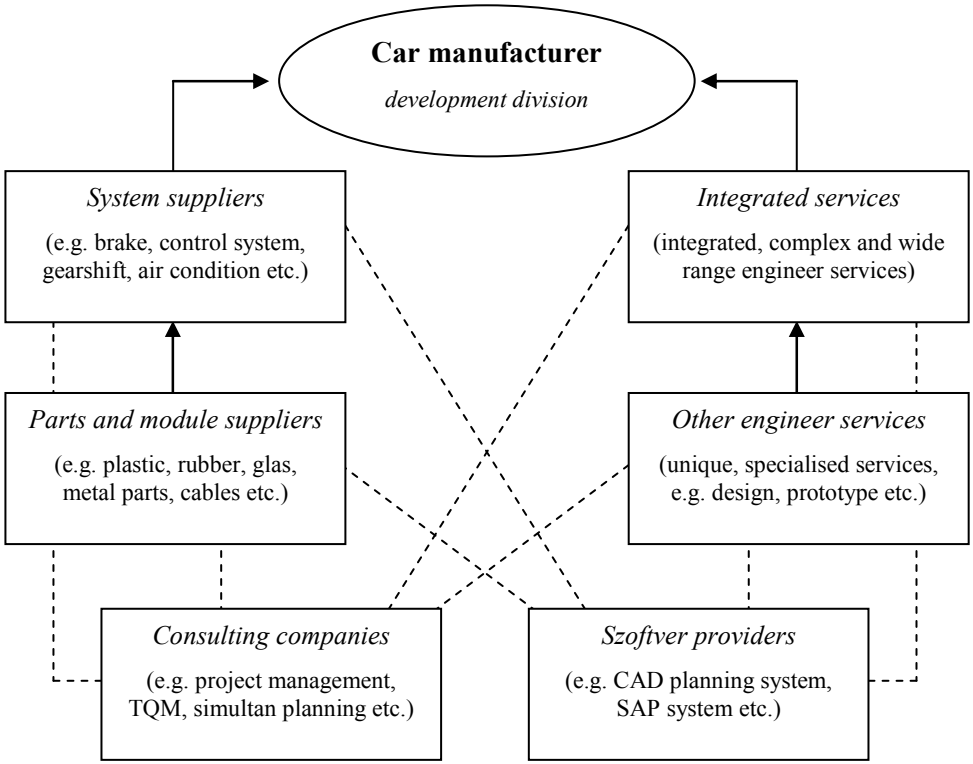
Jürgens is on the opinion that this process will further be accelerated and will trigger further positional changes in the automotive sector of the whole value chain. Car manufacturers will become brand integrators and assembly specialists and will also coordinate the major tasks of development. At the same time technology and continuous development are turning into key issues for supplier too stimulating raw material, spare or component part suppliers to develop into experts of their own technology (*Jürgens, 2003*). Along with the ongoing concentration specialisation, another even more powerful trend may be observed in the sector which should exclusively stand on the basis on complex labour division and cooperation systems.

Despite the ongoing concentration process the majority of European suppliers – principally the community of tertiary level car part suppliers – are small and medium-sized entrepreneurs. As a result of the afore-presented transformation process in the vertical production system the future perspectives and chances of the whole motor vehicle industry will largely depend on the innovativeness and competitiveness of this SME sector. These geographically concentrated cooperative networks labelled as technological cooperation networks or individual clusters have very important role in increasing the competitiveness of this SME sector. The final objective of these cooperation initiatives is to provide assistance to SMEs in getting an easier and cheaper access to relevant technological information and to business and economic services needed for their development and for the increase of their competitiveness. Government funded organisations have an important role in the organisation of networks and clusters even in the most developed countries and we should learn as much as possible from their examples to successfully adapt them into the Hungarian environment.

In our era of tough competitions for meeting quality and timely factor driven demands companies and manufacturers need more instant information about the functioning of their own corporate system and environment. Today car companies are facing various challenges such as the slowness of global economy, weak or weakening car markets, toughing competition and changing demands. To preserve their market positions the actors of car industry cannot just relax and watch the ongoing rapid changes of their environment but they should instantly react to the challenges of market. At the same time not only the globalising economy but also the competition for the consumers' choice does force companies for making hard resolutions. Under the pressure of tough competitions transnational motor vehicle companies are investing millions of dollars into R&D serving as a basis for product development granting continuity for model changes and into technology development ensuring a more efficient production system. At the same time on the

grounds of the aforementioned changes besides major car manufacturers secondary and tertiary suppliers with companies providing specific services have an increasing role in development activities (Figure 2). As we have seen it development specialists and technology service providers have growing importance in this matter. Although automotive industry today cannot be regarded as a newly emerging industry the application of high technology is still playing a very important role in this sector.

Figure 2
The network of car development (actors and relationships)



Source: The author's own edition on the basis of Rentmesiter (1999).

As a summary we can state that for the continuity of daily work and production (preference of just-in-time systems) and for the coordination of R&D the geographical proximity of car manufacturers and their satellite organisations consisting of system and module suppliers, raw material suppliers and other industries with the whole sector's spatial concentration have strategic importance. This geographical concentration with the evolution of networked cooperation systems are catalysing clusterisation by creating such new organisations and institutions in the region that will contribute to gaining maximum profit from the advantages of synergic effects resulting from their automotive services and activities. For example in several cases the sector's territorial concentration is followed by trainings, in most cases specialist trainings, by the harmonisation of higher education with the demands of automotive sector, by the establishment of new university or private research facilities, by the foundation of cooperation research complexes and competence centres, by building supplier parks providing adequate background facilities for suppliers etc. For contact maintenance and for facilitating information flow among enterprises, a bottom-up schemed network of federations, associations, professional organisations further catalysing clusterisation by their specific services (meetings, databases, information services etc.) is being formulated.

4 Experiences of automotive clusters in Europe

Automotive industry is strongly concentrated geographically both on global and regional levels. From the EU's 15 old member states nearly 50% of value-added revenues in automotive industry are originating only in Germany. This territorial concentration – partly because of the foreign direct investments of German car manufacturers⁴ – may also clearly be observed in the countries of East Central-Europe, particularly in the Czech Republic, Slovakia and Hungary where automotive industry has a leading role in industrial specialisation.⁵

Everyone associates automotive industry and its spatial concentration with the name and seats of the largest American car companies (General Motors, Ford and Chrysler having merged with the German Daimler Corporation). However, due to

⁴ In the past five years more than one quarter of German car suppliers' new enterprises started up in East Central-Europe (*European Competitiveness Report... 2004*).

⁵ Despite the yet very small contribution of East Central European countries to the output of the European automotive industry this sector has a very important role in these countries' domestic industry and national economy. In the Czech Republic the contribution of automotive industry is 10.9% to the gross industrial value-added production. In Hungary this figure is 10,1% and in Slovakia it is 8.2%. Regarding that mostly car assembly oriented, i.e. low value-added yielding activities have been relocated into these countries they have even higher contribution to industrial sales and exports (*European Competitiveness Report... 2004*).

the aforementioned restructuring processes, new territorial concentrations of automotive businesses and institutions are emerging in several other places than Detroit in America, Europe and Southeast-Asia as well. In Europe an intensive clusterisation process may be observed both in the countries of high industrial development (Germany, Italy, France) or in certain regions, districts of certain small states. Just a few examples for the latter phenomenon are the Bavaria, Turin region, Basque, North-England, Wales, Austria or even the Czech Republic and Slovakia having pushed themselves to the frontline of automotive industry during the past few years. In several cases clusterisation processes created other clustered organisations working in another corporate scheme in such countries as for example Germany (VIA, BAIKA, Automotive Saarland), Spain (Basque, Catalonia), Austria (AC, CDT, AOEM, ACstyria, AVCR), Slovenia (AC Slovenia), France (Cluster des Vehicules Industriels) or England (Northwest Automotive Alliance) (*Grosz, 2000*).⁶

This paper is going to present examples from Wales, North-Rhein-Westphalia, Styria and Upper-Austria with the activities of their satellite organisations, to demonstrate foreign practices to contribute to the successful research of Hungarian cluster initiatives. We selected Wales Cluster Initiative because, as we will see later, the potentials and problems of the Welsh Economy are in many aspects similar to the phenomena of today's Hungarian economy, and we are on the opinion that learning from the Welsh model of innovation-oriented economy and business development may significantly contribute to the successful management of Hungarian problems. We also consider the presentation of the initiatives of Austrian motor vehicle industry very important because they were the most important reference areas for Transdanubian automotive clustering in Hungary. Especially the example of Automobil Cluster founded some years ago in Upper-Austria was the most useful adaptation model for the start-up of Hungarian initiatives. The experiences of the German and Austrian clusterisation models in automotive industry may be useful from the aspect that foreign direct investments originating from these countries had and still now have key importance in the dynamic development of the Hungarian automotive sector operating in whatever forms of its corporate structure be a multinational firm, car manufacturer, secondary or tertiary supplier or small and medium-sized enterprise.

⁶ The acronyms of the above-mentioned automotive cooperation formations – some of them will be introduced in details later – are the abbreviations of the following initiatives: VIA: Verbundinitiative Automobil Nordrhein–Westfalen, BAIKA: Bayerische Innovations- und Kooperationsinitiative Automobilzuliefererindustrie, AC: Automobil Cluster Oberösterreich, CDT: Cluster Drive Technologie, AOEM: Österreichisches Zulieferforum, ACstyria: Automobil Cluster Styria, AVCR: Automotive Cluster Vienna Region, AC Slovenia: Automotive Cluster Slovenia.

4.1 Welsh Automotive Forum (WAF)

Until the 1980s the role of Wales in the UK was restricted to the provision of agricultural and heavy industrial inputs. For this reason heavy industry, namely coal mining and steel making were dominating Welsh economy. After World War II the government's subsidisation of heavy industry greatly contributed to the establishment of manufacturing industry which task was assigned to the Welsh Development Agency (WDA) in year 1976. The government's support was designated for terminating coal and steel related jobs and opening new jobs in manufacturing industries with the financial subsidisation of European, American and Japanese direct investments. At the initial phase of this programme due to the dominance of foreign direct investments the Welsh branches of consumer goods manufacturers with semi-skilled labour were the leading organisations of manufacturing industry. The relatively low wages, the low skills of labourers and the European Union's funding significantly increased the competitiveness of Welsh economy. Later on foreign enterprises equipped with high technology created adequate conditions for building a supplier network of small and medium-sized enterprises and for a quick growth of jobs within these enterprise categories. The different governmental subsidisation programmes greatly contributed to these processes (Cooke, 1998).

The majority of capital was invested into car assembly and car module manufacturing and also heavy sums were invested into electronics industry. Several leading car manufacturers built engine manufacturing plants and assembly lines in Wales (e.g. Fiat, Opel, Renault, Saab and Volvo). On the basis of these major investments the region grew into a major European centre of car engine and component manufacturing. These Welsh firms – as indirect or direct suppliers – were able to establish strong cooperation with investment projects that have been implemented by these foreign car manufacturers. Besides Welsh car manufacturers British car companies (Rover, Jaguar, Ford, Nissan, Toyota, Honda, GM and Peugeot) also did have an important role in accelerating the building of networked cooperation in motor vehicle industry. As a final word we can say that the majority of native Welsh and newcomer automotive businesses were functioning as external suppliers for final assembly plants located outside Wales.

In Wales, innovation and technology policies, infrastructure development with the building of their associated networks were the key development factors of engineering – or to be more precise – motor vehicle manufacturing industry. During a ten-year period between 1985 and 1995 with the support and an active initiation of WDA 9 supplier associations and 8 supplier groups were established with additional 8 business networks. One of them is the Welsh Automotive Forum (WAF) setting up the target of channelling the opinion of Welsh suppliers, the organisation of idea and experience exchange forums, and in general the integra-

tion of the actors of motor vehicle industry. Since 1990 WAF has been directed by an appointed manager. The operation of WAF in the start-up phase was funded both by the WDA and the government of the United Kingdom but since 1998 a membership fee has been paid by participant enterprises amounting up to 70% of the revenues of the budget. From the major features of the Welsh Automotive Cluster Cooke is emphasizing the extremely strong concentration of motor vehicle industry, the intermediary and end user generated demand, the presence of auxiliary sectors in the region, the building of supplier networks ranging from car module manufacturing to the assembly of complex systems, the public-private partnership both in R&D and professional training, and an efficient distributive infrastructure of financial subsidies (Cooke, 1998). On the grounds of these premises today automotive industry is one of the fastest growing economic sectors in Wales. Those big multinational car companies having settled down here have 170 local suppliers. Of them 40 are primary or secondary level system and module part suppliers. Today the number of staff employed at car companies is exceeding the value of 25 thousand.

After the foundation of the Welsh Automotive Cluster economic and regional development agencies set the surveying of the demands of newcomer foreign enterprises their primary task. Their decisions were motivated by their efforts to fully meet the multinational companies' and their satellite minor suppliers' requirements towards the region's human resources. They set the learning from foreign companies' experiences their primary objective. The application and adaptation of 'best practice' in foreign partner regions (for example in Baden-Württemberg) and the monitoring of major competitors (Ireland) were great help for the Welsh automotive cluster.

The strategic objective of the development of business infrastructure was the embedding of foreign companies into the economic system of Wales. WAF's business development services paid special attention for SMEs focusing on their innovative skills. Permanent innovation, quality centred production and the introduction of a highly efficient production system in SMEs greatly contributed to the enlargement of potential and existing supplier networks and created a rapidly increasing number of new jobs in this sector. The introduction of quality assurance systems (ISO 9000 for example) meeting the demands of big companies, accreditation and – especially in our age of information – electronic data circulation and e-commerce among entrepreneurial networks were in the focus of attention at WAF (Cooke, 1998b).

The presence of Japanese – and to some extent German – firms who unlike North-Americans were actively building good supplier relations was very important for permanent innovation based production and cooperation systems. The Japanese were even ready to bring machinery and experts with them just for strengthening the ties of cooperation with WAF. The Welsh Automotive Cluster

has been proved very useful, especially in such areas as research-development and innovation. More than 40% of the enterprises of WAF are getting technical development information from their own partners (customers, vendors), 32% have established corporate associations, cooperative networks and have collaborated with higher education (technical universities) in their technical development projects. Within the cluster owing to good partnership relations between higher education and economic sectors the newcomer companies of the region – except for a part having very important research-development plants – are not engaged in basic research because they are going to adapt the primary research results of the University of Wales into practice. Besides corporate R&D laboratories several university laboratories are doing applied researches. A significant part of technology transfer at the region's enterprises is implemented by corporate networks and by institutes of higher education.

4.2 Verbundinitiative Automobil (VIA)

North-Rhine-Westphalia concentrating one-third of the German automotive industry is a critical mass within the European automotive sector. Nearly 800 automotive enterprises are operating here with 200 thousand permanent jobs. The North-Rhein-Westphalian government facing problems in economic and industrial restructuring was the first to implement cluster-oriented industrial policy to tackle the recession of automotive industry and to beat down the rise of unemployment and to stop the transformation process of the supplier chain system.

For facilitating the restructuring of regional economy and for increasing the region's and automotive suppliers' – principally the SME sector's – competitiveness the Ministry of North-Rhein-Westphalia established Verbundinitiative Automobil Nordrhein-Westfalen (VIA) in 1993. This initiative has been founded by the representatives of car manufacturers and suppliers and later it was expanded by new members: chambers, various alliances, trade unions and ministries. After five years of successful operation it was transformed into an independent organisation. VIA's essential mission is providing assistance to everyday cooperation projects between car manufacturers and suppliers (*Analysis of Transnational Networking...* 1999).

Until 2000 750 enterprises had participated in the initiative and had launched more than 280 cooperation projects. Of them 55 projects were subsidised by the government of North-Rhein-Westphalia with a sum of 20 million deutsche marks. The assistance of the government was very important for SMEs as without it they would have been unable to launch successful innovation projects and their marketing. The government's assistance was targeted at SMEs as it is clearly seen from the financing system of cooperation projects. While the government was

financing up to 40% of the SMEs' total project expenses, big companies were receiving far less amounts of financial compensation from the government and big car companies received no compensation at all. The intensity of cooperation between car module, car part suppliers and car manufacturers has significantly increased.

The initiative provided the following services for members:

- Project definition, project preparation and project description for enterprises and their cooperation partners,
- Partner finding service for the implementation of the existing project plans,
- Building and assistance to cooperation networks for the successful implementation of projects
- Monitoring governmental (ministerial) funding opportunities and informing enterprises of them,
- Consultation and assistance to the preparation of tenders.

The projects' generated knowledge transfer, the new opportunities of market and innovations all increased the competitiveness of suppliers operating mostly in the corporate structure of SME. The region's technology centres and science parks (their number is over 60) are providing excellent facilities for technology enterprises, 'spin-off' firms and for the R&D activity of automotive suppliers. The transfer of the latest development results is fostered by projects assisting to the cooperation between enterprises and higher education and research centres.

4.3 Automobil Cluster Styria (ACstyria)

The establishment of the automotive cluster around Graz (Automobil Cluster Styria – ACstyria) following the example of North-Rhein-Westphalia was also initiated by the provincial government. Following a survey commissioned by the Ministry of the Economy of Styria and carried out in 1994 revealing the development potentials of automotive industry, the largest automotive companies of Styria who have recognised the cluster as a great chance for improving their supplier network were ready to build a cooperation network.

ACstyria was established with the assistance of the Styrian government in the summer of 1996. Governmental subsidy was granted to ACstyria during the first two years of its operation under the cluster management of Steirische Wirtschaftsförderung (SF6-Styrian Enterprise Agency). Seeing the success of the first two years ACstyria members decided to maintain their cooperation system after the expiration of state funding period and created an independent, self financing cluster management organisation funding from membership fees to be paid on

annual basis. For ensuring a smooth transitional period into self financed funding the government subsidised those services that membership fees were insufficient to cover. The government is still co-financing projects that are reinforcing the network's innovative and economic structure or increasing the competitiveness of automotive sector (*Analysis of Transnational Networking...* 1999).

Until 1999 the everyday management tasks of ACStyria were performed by SFG. The Advisory Board having decision competences in strategic issues consisted of the representatives of the biggest car manufacturers (BMW, AG, VW-Audi AG etc.) as buyers, of the management networked suppliers, SMEs of the most active research institutes and naturally, of the representatives of Styrian government, the major financing agent of ACStyria. ACStyria GmbH, the independent self-sustaining economic organisation was founded in year 1999. Among the members of the one director led ACStyria were various suppliers (Magna – a system supplier, Krenhof – a car module supplier), technology service providers and advisors (AVL, TCM), an advisory organisation (Agiplan Group) and other corporations engaged in professional interest representation (IVS) and economic development (SFG).

Since the foundation of cluster more than 190 firms with 13 thousand jobs have participated in this partnership network. The current number of partners is 98 and additional 200 are participating in the cluster as 'visitors' (they have been registered in the database or may join the common R&D projects if they wish). As these visitor companies are not charged by membership fee they are not eligible for using services free of charge. Along with enterprises the major local R&D and innovation organisations (e.g. the Technical University of Graz, Joanneum Research Institute) and external expertise have also joined the partnership network.

Cluster members are eligible for all services of the cluster free of charge but since 1999 these services are available for membership fee paying organisations only. Other businesses showing interest for the cluster's activity may also get professional support through their cooperation with a cluster-member and are eligible for various cluster services such as:

- Communicational platform (a full database of cluster members)
- Information services (market trends, EU development sources, a periodical bulletin of the cluster)
- Assistance to common projects (in R&D and quality affairs mainly)
- Cooperation partner finding services
- Marketing and PR activities both in domestic and international sites
- Organisation of specific training programmes and study trips

4.4 Automobil Cluster Oberösterreich (AC)

They are outstanding in performance, in professional skills and in innovation. Upper-Austrian suppliers have good reputation worldwide. These features will keep on being improved with internal corporate innovation and it will transfer various professional information and resources for automotive specified networks in Upper-Austria. AC is mostly backing up and promoting the innovation potentials of SMEs.

Along with ACstyria this cluster is another extensive cooperation network of automobile industry in Austria with high capacities in Linz-centred Upper-Austria which considering the number of members and jobs is by far larger than the automotive cluster of Styria. Automobil Cluster Oberösterreich (AC) was founded in 1998 only but by now it has grown into Europe's most successful cooperation network. The sector's concentration density is illustrated by the fact that Upper-Austria earns 40% of the total value-added of the Austrian automotive sector. The enterprises (car manufacturers, commercial vehicle manufacturers and their suppliers) of the network with nearly 300 members employ a total staff of nearly 80 thousand in the region. The annual revenues of clustered enterprises are exceeding the total value of 16 billion euro. Alike in North-Rhein-Westphalia, here 80% of new jobs have been opened in the SME sector.

Although a survey carried out in 1993 has highlighted the very strong concentration of car companies here and revealed their relationship system, until the late 1990s no steps had been made for the intensification of inter-firm cooperation partnerships. For the first time it was the strategic programme of Upper-Austria having been prepared in 1998 which targeted cluster-oriented technology and innovation policy at increasing the innovation potentials and the competitiveness of SMEs by building a more intensive cooperation partnership between the region's incoming enterprises and the local organisations of research and technology (*Strategic Programme Upper Austria 2000+*, 1998).

The intensification of entrepreneurial partnerships, the ameliorating of the automotive sector's general environment, the increase of the competitiveness of regional suppliers, the preservation of jobs and the region's advantages for attracting new enterprises are the primary objectives of Automotive Cluster of Oberösterreich. AC has the aims of intensifying cooperation between enterprises and technology transfer organisations (universities, research institutes, innovation centres) and providing assistance to SMEs all they need for their development. The management of AC is performed by Oberösterreichische Technologie- und Marketing Gesellschaft (TMG – Upper-Austrian Technology and Marketing Company) established by the Government of Upper-Austria with the purpose of assisting to the utilisation of the region's innovative potentials and attracting new companies into the region. This management organisation is in a continuous

growth; today nine experts are managing directly the cluster's activities. The government's generous subsidisation granted free of charge membership for AC members and other organisations during the first three years of its operation. Today an annual membership fee of 500, is charged for SMEs and EUR 1000, for big companies. These are cheap and affordable prices for all types of economic organisations in this sector. However, for this fee the German Agiplan Consulting Co – on the basis of their demand-offer analysis strategy is providing a wide palette of services for cluster members. These services may be arranged into five categories

- Providing information and communication services for partners in several forms ranging from printed and electronic periodicals, journals through factory study trips until the access of supplier catalogues and cluster member databases. These services are aimed at providing various information customised to the members' needs and at intensifying the circulation of information among members. TMG is hosting an extensive corporate database with detailed information on its member companies and another database on the accessibility of Austrian and international research institutes with their technological specialisation for an easy finding of cooperation partners.
- It goes without saying that efficient innovation and R&D require adequately trained labour. This motivates AC to organise various – automotive industry related – training programmes, professional events, seminars and study trips. Professional education programmes, trainings, the organisation of events, conferences, workshops and study trips – with special regard to facilitating the exchange of experiences and common learning – are also organic parts of AC's training and event organisation activities.
- The automotive cluster's assistance to the preparation, development and financing of cooperation projects is one of its most popular services because it enables enterprises for cooperating in several areas (R&D, manufacturing, marketing, logistics, quality assurance, information technology etc.) through refunding some of their expenses. The amount of refund is depending on the project's contribution to the general competitiveness and innovation potentials of the region's automotive sector but may not exceed 40% of the project partners' total expenditure. Minimum three enterprises (without any size limitations) or research or educational institutes should enter into project partnership. Minimum one small and medium enterprise should be involved into the project but it may come from outside of the region as well.
- Marketing and PR activities are focused on the automotive cluster's positioning in domestic and international markets. This category may be

extended by such activities as the publication of the cluster's informational and promotional materials, regular PR activities and the promotion of the cluster's member organisations to manufacturers and primary level suppliers.

- And finally, the presence on international markets is also an organic part of the cluster's services. For this purpose the cluster is providing professional assistance to its members to participate on international automotive exhibitions, markets, market visits and building contacts with local organisers. Setting up contacts with other international car manufacturer and supplier networks (e.g. BAIKA or VIA) are also associated with this area.

By now the cluster has completed more than 40 cooperation projects, more than 220 companies have developed new products, new modules, new systems and they are still developing new processes and continually improving their skills for meeting the demands of automotive industry. The Upper-Austrian Automotive Cluster is not else than an innovative leading edge behind the domestic supplier sector and a strong partner organisation for car manufacturers and system suppliers. Since its foundation in 1998 the cluster has grown into the most extensive network of automotive industry and this is evidently may be verified by the size of its corporate staff. Innovative cooperation projects are the key areas of the automotive cluster's activities in organisational, quality and qualification fields. Common optimisation, new products and processes have not only opened the way towards quality development and radical cost reduction but also demanded long learning processes. Since the foundation of the automotive cluster 30 projects have successfully been completed with the contribution of more than 120 partners. The following companies may be considered as the cluster's major member organisations: BMW Motoren GmbH, MAN Steyr AG, Voestalpine Stahl GmbH, Rosenbauer International AG, AVL List GmbH, BRP Rotax GmbH.

4.5 Automotive Cluster Vienna Region (ACVR)

The Automotive Cluster of Vienna was founded in November 2001 by the cooperation of Ecoplus, The Lower-Austrian Economic Development Agency and the Foundation for the Economic Support of Vienna. As a technological cluster, ACVR identifies and keeps an eye on key technologies offering high development potentials in the region. Within the automotive sector ACVR pays special attention for telematics, logistics, micro- and nanotechnologies and the alternative solutions of automotive technology.

Increasing the number of added-value car modules, with the share of R&D and the innovative activity of companies joined in the cluster are the major functions of ACVR. ACVR initiates and coordinates cooperation among cluster members and provides marketing services for a greater harmonisation of products and services. The cluster's international cooperation with the new member states of EU (Hungary, Czech Republic and Slovakia) deserves special attention. The availability of the cluster's website besides German in other languages such as English, Hungarian, Czech and Slovakian is a clear indicator for the cluster's readiness for international teamwork and its efforts for the intensification of cross-border cooperation.

The cluster set the concentrating of automotive experts into the Vienna region and the launch of innovative projects as primary objectives. The Vienna region has plenty of experts who are successful network builders. Automotive experts with extensive quality and project management experiences are maintaining contacts with a great number of suppliers. Recently the cluster has set up new contacts with entrepreneurs, R&D and educational institutes, policymakers and their supporting organisations. The attention of the networking experts of ACVR is focused on 'Intier' area comprising such fields as telematics, design, materials, security and human-machine relationship. ACVR has an ambition of developing into the 'innovation engine' of Europe. The Slovak, the Czech and the Hungarian partners with their building of large car manufacturing plants are also getting closer to the practical realisation of this idea. All network activities are targeted at increasing the value adding potential of members increasing with them the competitiveness of Vienna region as well.

Since 2005 ACVR has been providing several information, marketing and cooperation services in its Centre of Transport and Logistics Technology (TECHbase Vienna) functioning as a focal point of automotive sector. Besides TECHbase the cluster with some of its cooperation partners is planning to build two additional technology centres for automotive suppliers. ADC (Automotive Design Centre – ADC) is designated to provide various external and internal design services because the interrelationship between design and technology is an issue of growing importance for automotive suppliers. The Centre for Industrial Relations will provide help for companies during their partner selection, manufacturing profile change and quality assurance period.

4.6 Summary of foreign experiences

Of the above-presented examples the Welsh case is the most important as Hungary is facing similar problems today to those that Welsh economy has already tackled down. The spectacularly inflowing foreign direct investors and multina-

tional firms especially in electronics and car industry were doing their best to make use of the comparative advantages of high-skilled but compared to the European average relatively cheap labour. For this reason the majority of foreign investments were directed into high import and low value-added producing sectors (as simple assembly activities), with zero embeddedness of foreign companies into regional economy and apart from a few cases – multinationals were unable to build up their domestic supplier chain systems. Thus, the inflowing relatively high technology and knowledge was unable for pushing Welsh economy forward sufficiently and it was a real threat that foreign enterprises bound with weak ties to regional economy will relocate their sites into developing countries when losing their comparative advantages.

The present problems of Hungary's dual economy were successfully eliminated by the above presented network development, common development, innovation project and regional innovation system based strategies and their application was a great progress towards the integration of multinational firms, towards the quick penetration of innovation and R&D results through the supplier chain system and towards increasing the competitiveness of SMEs. Regional cluster policy may have an important role in it, because – as it is seen from the examples of foreign partners – with building an adequate economic and business environment – they can assist to their business development, to the reforming of their subsidisation policy and to facilitating the networking of business partnerships and to the enhancement of the structural system of regional policy.

Foreign case studies also prove that only networked business partnership systems may operate in the hope of success. To increase the competitiveness of SMEs special attention should be paid for the development of their innovative and R&D capacities and this may be done most efficiently by the promotion of knowledge transfer in their common research projects with large companies – their own customers – and with technology centres, research institutes and universities. Clusters should offer such advantages – especially for SMEs – that entrepreneurial networks could never do alone. Product and production oriented innovation should be the ultimate objective of cooperation as they are the key factors of competitiveness. Network building is a multi-dimensional process which means that besides enterprises various institutions and organisations (public and private universities, research institutes, automotive associations, chambers and business development agencies etc.) should be involved into the cluster.

The financing of political actions is a very delicate issue in all platforms. The political supporting of clusterisation with the active subsidisation of cooperation initiatives, as we have seen it from Welsh, German and Austrian examples, has major importance in cluster building. In all of the above-presented examples the initiation and support of either a regional government (North-Rhein-Westphalia's Ministry of Economy, Technology and Transport) or a government-bound eco-

conomic development organisation (Welsh Development Agency – WDA, Steierische Wirtschaftsförderung – SFG, Technologie und Marketing Gesellschaft – TMG) was needed for the establishment of a cooperation network or for its successful management in the first years of its operation. Even in developed countries the foundation of a self-sustained economic organisation is recommended only in case when its participant actors have been convinced on the necessity of its existence and have been aware of the benefits their partnership may grant for them.

5 Clusterisation in the Hungarian Automotive Industry

5.1 Clusterisation in automotive industry

In Hungary almost every regions or microregions have plans for the support of economic networks or clusterisation or for the establishment of independent cluster organisations. Several experiments have been made so far for the application of cluster-oriented approach to some extent in several economic fields and sectors or for transforming potential or latent clusters into operating clusters or in some cases developing clusters into operating clusters. Of Hungarian clusterisation processes or developing clusters, perhaps it is the automotive cluster that may be regarded to be in the most advanced phase. In this chapter we are going to reveal the details of the clusterisation of Hungarian automotive industry to find an answer for our hypotheses we have set up on the automotive industry in the North Transdanubian region and on its cluster-oriented development potentials. In our empirical research we are going to analyse the territorial concentration of automotive industry on the basis of secondary data to verify that the sector's geographical concentration, one of the essential criteria of clusterisation has already taken place. This will be followed by an analysis on the qualitative features of clusterisation on the basis of interviews having been prepared in various car industry enterprises or other organisations engaged in automotive sector and its development. This qualitative analysis of clustering comprises several areas, such as the intensity of cooperation among members in the emerging automotive cluster of North-Transdanubia and between cluster members and other non-clustered organisations, the parameters of R&D activities, the information flow within the cluster and the major determinants, the stimulating and inhibitory factors of the cluster's competitiveness.

5.2 The spatial concentration of Hungarian automotive industry

During the 15 year period since the change of regime in Hungary the direct investments of foreign-owned companies have had outstanding impacts on the modernisation of Hungarian economy. The number of enterprises with over 50% share of foreign capital stock is estimated as 17 thousand and the number of staff they employ is over half million (550 thousand) making out as much as 19% of the total jobs. The share of foreign capital in registered capital stock is over 30% on nearly half of the country's territory while nearly half of the total value-added is earned by these companies. Their importance is even higher in foreign markets with their 76% share from the total import and 80% share of the total export.

Good geographical positions, advanced infrastructure, relatively cheap but high-skilled labour, old industrial traditions and last but not least the flexibility of local management urge foreign direct investors for concentrating their financial investments in Budapest, in its agglomeration and in North-Transdanubia. In the latter region, principally in Fejér, Győr-Moson-Sopron, Vas and Komárom-Esztergom counties a very intensive industrial development process has been going on which is featured not only by geographical concentration but by strong sectoral dominance as well. Various indices, such as the total amount of foreign investments, gross production value or export sales revenues are verifying the leading role of engineering sector in regional economy. Computer manufacturing, electronic module part manufacturing, car and car component part manufacturing have outstanding role within engineering. Between the mid-1990s and the early 2000s the annual growth rate of car module part production was 30–40%. These four sectors totalled up to 80% of the output of engineering industry (*Baráth–Molnár–Szépvölgyi, 2001*).

In the early 1990s vast investments were made into automotive industry in Hungary. Several foreign companies selected North-Transdanubia for their operation site. It was large multinational firms who were the first green field investors by relocating a part of their capacities to Hungary for selling cars on European markets. Suzuki opened a manufacturing branch in Esztergom with an investment value of over 500 million euro to introduce their new model into the EU markets. Ford built some car part assembly lines (gearshift, electronic engine ignition system, fuel pumping system, linear sparking coil etc.) in Székesfehérvár⁷ a city with old engineering traditions from the past (Ikarusz, Videoton) trying to find a way out of crisis by introducing a new, supply-oriented economic policy. Opel having been merged with General Motors has built an engine factory in

⁷ As a result of corporate restructuring at Ford car part manufacturing has been outsourced into an independent firm and the Székesfehérvár plant now is working under the name of Visteon Hungary Kft.

Szentgotthárd just on the Austrian border with an investment of half billion EUR was producing car parts was also involved in car assembly for some years. Audi, a member of Volkswagen syndicate located the manufacturing of its latest engines into Győr, another city of significant engineering heritage (Rába), and launched the manufacturing of Audi TT and Roadster here too in 1998 and later on these two brands were extended by the new A3 model. Owing to these investments today worth of 2.3 billion euro Audi Hungarian Motor Ltd. became the leading manufacturer of Audi engines (*Table 1*).

Table 1

The major data of the largest car manufacturers, 2004

Name	Audi	Suzuki	Opel
Products, items	engines (1.480 thousand), cars (23.589)	cars (93 thousand)	engines (456 thousand), cylinder heads (461 thousand)
Sales revenue (million EUR)	3.924	890	560
Statistical average of the number of employ- ees (people)	5074	2045	739
Hungarian suppliers	below 10%	25%	10–20%
Value of investments until the end of year 2004 (million EUR)	2.335	550	655
A sample of the Hun- garian suppliers	Temic, Jung, LuK, Ikarus Préstechnika, Hydro Alumínium- technika, Sokoró	Benteler, Ryowa, SEWS, Rába Mór, Summit, U-Shin, Stanely, Toyo, Ajkai, Ajkai Elektronikai	Sapu, Leoni, Lear, Pemü, Temic, Kaloplasztik, Bakony Művek

Source: The author's own edition.

These big car manufacturers settled down in Hungary between 1990 and 1994 were followed by additional global and medium automotive suppliers and sub-contractors whose majority also decided to open a branch in Hungary. VAW⁸ established a green-field plant for servicing Audi in Győr, while Sumimoto was founded as a supplier for Suzuki in Esztergom. Several other multinational firms

⁸ Due to changes in the ownership of the parent company VAW Aluminiumtechnika Kft the company now is operating under the name of Hydro Aluminiumtechnika Kft.

followed a similar strategy and this has still been a part of their practice during the past few years (*Grosz*, 2001, 2002, 2003).⁹

Besides foreign-owned companies traditional Hungarian firms of automotive industry should also be mentioned here, whose position has been consolidated after the change of regime. Rába Járműipari Holding Rt. [Rába Automotive Holding] looking back to a 100 year history is profiled in under-carriage manufacturing (the world's fourth biggest under-carruage manufacturer) and in car accessory manufacturing (Rába is the most important supplier for Suzuki and Opel in Hungary). Although Ikarus Rt. is mostly profiled in bus manufacturing they think in a similar way to Rába – they should be more active system suppliers by integrating Hungarian small and medium-sized enterprises. Besides Rába and Ikarus the region has several other SMEs engaged in automotive industry trying to establish supplier partnership with big companies with more or less success.

Just like in the European Union 6% of the total jobseekers in processing industry find employment in motor vehicle manufacturing and by adding to this the data of all its related industries we can calculate with a figure of over 85 thousand jobs. The sector's share from the gross value of industrial production is even higher, exceeding the percentage value of 15%. *Table 2* is showing that vehicle manufacturing sector is still a dynamic one. Nearly one-fourth (23.9%) of foreign direct investments into the industrial sector are targeted at the automotive sector. By the end of year 2002 their absolute value exceeded the sum of 3.4 billion euro, the highest of all countries of East Central-Europe. The sector is strongly export-oriented its export share is exceeding 90%. The major destination of exports is the European Union, principally Germany.

According to CSO (Central Statistical Office) data 478 car companies were operating in year 2003. Of them 353 pursuing car manufacturing as main profile (KSH TEÁOR 3400) and 125 firms were directly involved into automotive industry by manufacturing car electronics products and car batteries (KSH TEÁOR 3140 and 3161). For methodological reasons our survey on the concentration of automotive sector is limited to these sub-sectors only which – as it is excluding enterprises involved in car industry as a second job only or without any regard to sales markets and chain positions are categorised by the statistical nomenclature into a different from the automotive industrial sector (electronics industry, chemical industry, synthetic material industry, glass industry etc.). Private businesses – as they are registered in a separate database – will also be excluded from our survey because their number and impacts on the global features and concentration

⁹ Just to mention some examples of the major foreign automotive suppliers: Alcoa, Albert Weber, Continental Teves, Delphi Packard, Denso, General Electric, Hammerstein, ITT Automotives, Konorr-Bremse, Lear Corporation, Leoni, Luk-Savaria, Michelin, Souftec, Tyco, United Technologies Automotive, Weslin etc.

level of the automotive sector is too low to have any significance on our research results.

Table 2

*The major data of automotive industry in Hungary
between 1999–2004*

	1999	2000	2001	2002	2003	2004
<i>Processing industry</i>						
Value of production (billion HUF)	7,887	10,525	11,329	11,442,	12,430	13,832
Percentage of export from total sales (%)	57.0	58.8	59.8	59.8,	61.5	63.3
Total number of employees (people)	742,899	752,562	752,562	746,963,	735,465	714,369
<i>DM Vehicle manufacturing</i>						
Value of production (billion HUF)	1,341	1,630	1,698	1,661,	1,913	2,048
Percentage of export from total sales (%)	90.1	91.7	91.7	90.2,	90.1	91.1
Total number of employees (people)	39,796	40,403	43,443	45,153,	47,332	48,114
<i>34 Motor vehicle manufacturing</i>						
Value of production (billion HUF)	1,294	1,578	1,640	1,595,	1,829	1,949
Percentage of export from total sales (%)	92.3	93.4	93.1	92.2,	92.3	93.0
Total number of employees (people)	32,051	33,179	36,101	36,133,	38,342	39,758
<i>34.3 Road vehicle, engine and module manufacturing</i>						
Value of production (billion HUF)	262.9	346.2	394	413,	494	571
Percentage of export from total sales (%)	85.5	87.7	87.8	87.9,	88.8	89.5
Total number of employees (people)	21,456	22,011	24,053	24,698,	27,413	27,793

Source: The author's own edition on the basis of CSO (Central Statistical Office) data.

When analysing the spatial distribution of automotive enterprises at the first glance it seems that the degree of their spatial concentration does not follow the quantitative indices of their location as 40% of car companies is situated in Central Hungary, 13% in Central-Transdanubia and 11% in West-Transdanubia, and even South-Transdanubia's 10% share from the total number of car companies is still a high figure while the representation of all the other planning-statistical regions in automotive industry is 7–8%. However, the analysis of the spatial distribution of automotive industry bound jobs instead of the number of businesses is much more important from the point of our survey as it is in a stronger correlation

with the importance of automotive businesses. In year 2003 the total number of automotive jobs was about 54 thousand on national level. 60% (38 thousand) of jobs were available in motor vehicle manufacturing and the remaining ones in car electronics and battery manufacturing categorised into car industry section in statistical nomenclature. The territorial distribution of car industry jobs is a valid indicator of the sector's geographical concentration. Here the weight of Budapest agglomeration – which region is generally over-represented in all areas of life due to its heavy economic dominance – is less than 9% and even Pest County's share from the total number of automotive jobs is only 13% from the Central region's 21.5% percentage. At the same time West-Transdanubia's 31.5% share Central-Transdanubia's 26% percentage of the total number of automotive jobs are clearly demonstrating the two region's nearly 60% contribution to total employment of domestic automotive industry concentrating less than 25% of the total number of Hungarian automotive businesses at the same time. This is a definite indicator of the concentration of elite automotive companies in Central and West-Transdanubia. 21 from the total of 31 car companies with over 500 employments are seated in these two regions and four are located in Budapest or Pest County.

The geographical concentration of automotive industry can be measured by the application of location quotient (LQ) a specific indicator discussed in my presentation of the scientific literature showing the relative weight of a sector in total employment. On the basis of the location quotients of motor vehicle manufacturing or automotive industry the core area of Hungarian automotive industry may clearly be identified (*Table 3*).

Both in motor vehicle manufacturing and automotive industry the LQ value of 1 is exceeded in West-Transdanubia and Central-Transdanubia only, i.e. here the total number of automotive jobs compared to the total number of all jobs was higher than the national average. As I have mentioned, international literature verifies clusterisation process over the LQ value of 1.25 but in our case *Table 3* clearly shows that in year 2003 in both regions the relative share of motor vehicle manufacturing was 2.4–3 times higher than the national average and in case of automotive industry this value was more than two and half times higher than the national average.

On county level the degree of concentration level is extremely in Győr-Moson-Sopron, Fejér, Komárom-Esztergom and Vas counties as LG is exceeding the value of 2 in all. Only Veszprém County has a lower but still significant LQ index while Zala County is out of the trend range because foreign direct investments here are principally bound to electronic industry and the role of car companies is less dominating. From the remaining areas of Hungary only Pest County, partly integrated into the economic space of Hungary's core area, and its neighbour Heves County – owing to the heavy investments of the past few years – are showing some definite signs of concentration in the automotive sector.

Table 3
*Location Quotient (LQ) values in Hungarian automotive industry
in years 2001 and 2003*

County	Motor vehicle manufacturing*		Car industry**	
	2001	2003	2001	2003
Budapest	0,341	0,332	0,336	0,317
Pest	0,978	1,101	1,842	1,640
Central-Hungary	0,474	0,504	0,650	0,613
Fejér	3,430	3,095	2,868	3,001
Komárom-Esztergom	2,854	3,066	3,013	2,779
Veszprém	1,233	0,898	1,689	1,447
Central-Transdanubia	2,561	2,384	2,519	2,442
Győr-Moson-Sopron	6,041	5,851	4,488	4,727
Vas	1,152	1,632	2,200	2,034
Zala	0,166	0,243	0,218	0,296
West-Transdanubia	3,057	3,112	2,681	2,744
Baranya	0,544	0,439	0,419	0,444
Somogy	0,091	0,088	0,063	0,063
Tolna	0,607	0,000	0,420	0,006
South-Transdanubia	0,408	0,216	0,300	0,211
Borsod-Abaúj-Zemplén	0,386	0,419	0,269	0,388
Heves	1,417	1,157	2,098	1,843
Nógrád	0,274	0,549	0,196	0,391
North-Hungary	0,638	0,638	0,737	0,781
Hajdú-Bihar	0,041	0,071	0,028	0,052
Jász-Nagykun-Szolnok	0,270	0,200	0,415	0,532
Szabolcs-Szatmár-Bereg	0,425	0,532	0,296	0,376
Northern-Great Plain	0,237	0,268	0,229	0,300
Bács-Kiskun	0,935	0,949	0,844	0,848
Békés	0,703	1,256	0,486	0,886
Csongrád	0,382	0,437	0,269	0,310
Southern-Great Plain	0,686	0,863	0,553	0,678
Hungary	1,000	1,000	1,000	1,000

* Motor vehicle manufacturing: TEÁOR 3400 Manufacturing of motor vehicles (3410 3420, 3430).

** Automotive industry: motor vehicle manufacturing + manufacturing of other engine and car electronics.

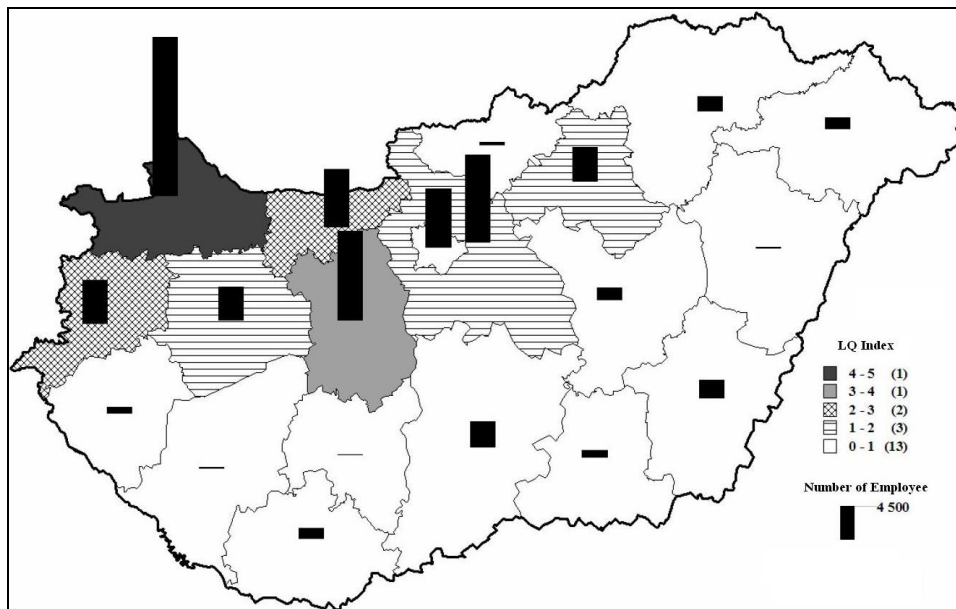
***The data of enterprises involved in car industry as a second job only or with main automotive profile but engaged in supplier sector only are excluded from the table.

Source: The author's own edition on the basis of CSO (Central Statistical Office) data.

In the mirror of the ongoing processes in these two latter counties we can definitely state that in Hungary the North-Transdanubian region is the core area of automotive industry spreading its arms towards the North-Hungarian region as following the line of M3 motorway. These counties have the largest number of employments in automotive sector with outstanding values in Győr-Moson-Sopron, Komárom-Esztergom and Pest counties and in Budapest as it is clearly seen in the figure below (*Figure 3*). A territorial comparison of output values or export sales revenues would result in an even higher degree of concentration than LQ indices.

Figure 3

The spatial concentration of automotive industry in Hungarian counties 2003



Editor: The author's own edition on the basis of CSO (Central Statistical Office) data.

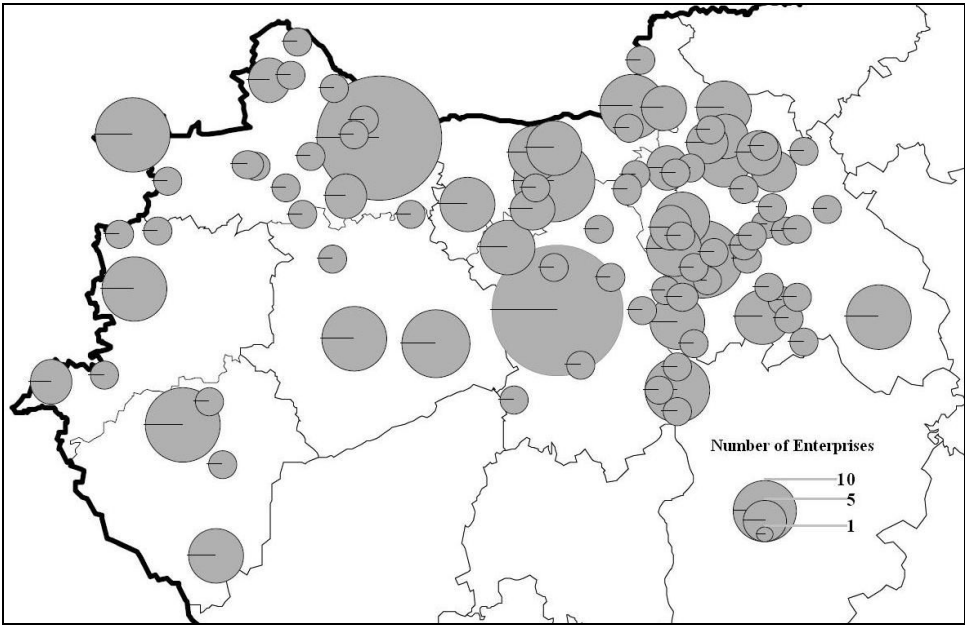
Foreign-owned enterprises have definitive role in the sector's spatial concentration who coming to Hungary can find favourable conditions for starting up their business in North-Transdanubia, Budapest and around its agglomeration (due to their more advanced infrastructure system, economic restructuring progress and labour market) but it should also be noted that due to big socialist companies and their background industries these areas were in a better position in the

past as well than Hungary's other parts. *Figure 4 and 5* are indicating the spatial distribution of enterprises and their employed staff within the core area of North-Transdanubia and they are also demonstrating the dominance of some industrial centres (Győr, Székesfehérvár etc.). However, and fortunately, not only big centres but also several minor settlements could successfully join the economic distribution of labour.

The changes of the past years (increasing minimum wage, faster increasing wages than productivity, the unavailability of high-skilled labour in certain regions etc.) and better investment prospects in other developing countries than Hungary (East-Europe, the rising countries of East-Asia) are lowering the chances of building new, big and labour-intensive plants in automotive industry. However, the increase of labour skills still creates better chances for attracting production systems of higher value-added and of advanced technology.

Figure 4

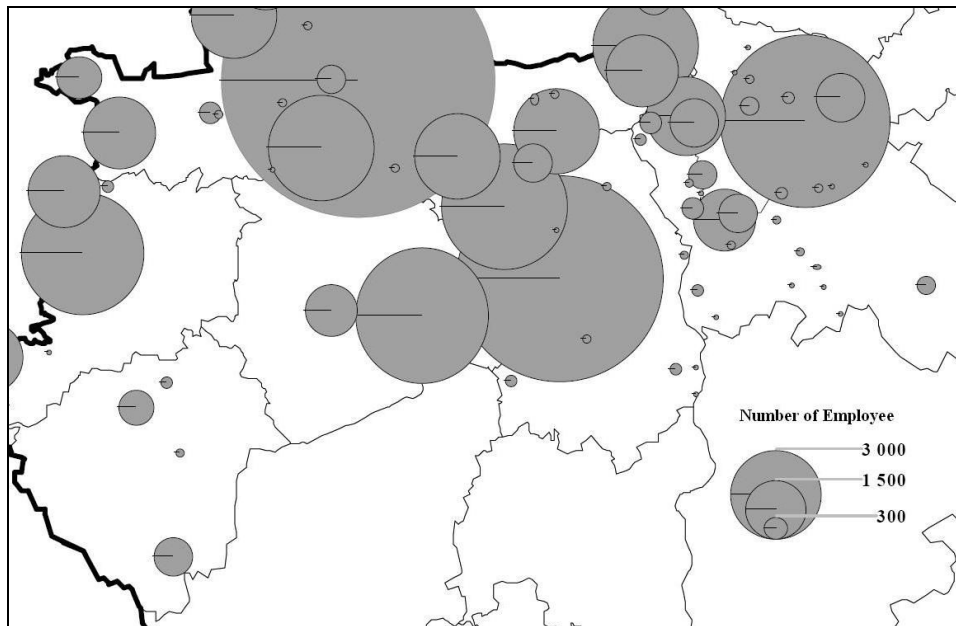
The spatial distribution of automotive businesses in North-Transdanubia, 2003



Editor: The author's own edition on the basis of CSO (Central Statistical Office) data.

Figure 5

The spatial distribution of jobs in automotive industry in North-Transdanubia and Central-Hungary



Editor: The author's own edition on the basis of CSO (Central Statistical Office) data.

5.3 The qualitative aspects of clusterisation in the automotive industry of Transdanubia

With statistical data it is easy to prove the spatial concentration of Hungarian automotive enterprises and the specialisation of engineering industry with car accessory and background industries in North-Transdanubia. At the same time the authors of clusterisation literature are on the firm opinion that geographical concentration is a necessary but not sufficient precondition of regional and industrial clusterisation. Besides geographical proximity clusterisation has several other major distinctive features such as a sophisticated system of labour distribution, a wide-scaled and extensive cooperation system, common R&D projects a collaborative partnership system between enterprises and non-profit organisations and last but not least an efficient information and knowledge circulation system.

In the following part of this paper a survey will be presented concerning the intraregional supplier relations, the major features of enterprises' R&D activities, their relationship with educational and training organisations, the key stimulating factors of clusterisation and other processes hindering or working against the building of a classical and well-operating regional cluster system.

Due to the specific nature of the processes to be analysed our survey is based on the special literature of clusterisation and on interviews having been at local automotive enterprises. Various actors of automotive industry at different positions have been selected as the subjects of interviews but our selection cannot be regarded as a representative one. Among others we have visited Hungary's two biggest foreign-owned car manufacturers: Audi Hungária Motor Kft [Audi Hungária Motor Ltd] and Magyar Suzuki Rt. [Hungarian Suzuki Co.]. Hungarian-owned big companies are represented by Rába Járműipari Holding /Rába Motor Vehicle Holding/ famous for its vehicle under-carriage manufacturing and as the most important Hungarian supplier for Suzuki and Opel with a strategic ambition of qualifying for the position of primary system integrator. Our sample has been extended with Albert Weber Hungária Ltd a typical German lease-work based company without any own products. Hungarian-owned firms are represented by Akai Elektronika Kft. [Ajka Electronics Ltd] a medium-sized Hungarian and foreign market oriented automotive supplier, by some minor relatively successful firms in Győr (Jankovocs Hidraulika Kft, Borsodi Műhely Kft) and by HNS Kft, a technical development company. Along with enterprises several other organisations engaged in automotive sector were interviewed (a cluster organisation, an innovation centre, an industrial park and an university) for a further refinement of data provided by big firms.

5.3.1 The progress of automotive supplier relations

Unfortunately the extent and intensity of the economic partnership of North-Transdanubian enterprises is below the desirable level yet but its trends of the past few years have progressed positively. For methodological reasons originating from the distinctive features of the automotive sector we should separate products processed during the car manufacturing cycle from non-serial materials, products and services involved indirectly only into the production cycle. This latter group is usually substituted by domestic suppliers after the first few years of the multinationals' operation in Hungary but the unfortunately the contribution of these non-serial fixtures to net sales revenue is very low. Almost all interviewed Hungarian companies reported on a low share of their subcontracts with multinationals in the delivery of directly used and fitted serial fixtures but at the same time they are maintaining business contacts with several Hungarian business organisa-

tions. At Audi the delivery share of serial fixtures is still below 10% originating principally from Hungarian branches of foreign-owned enterprises. Sokoró Kft seated in Tét is the only Hungarian supplier for Audi. Magyar Suzuki Rt is the only exception of the aforementioned trend because in Suzuki's case better positions in the EU markets demanded the presence of at least 50% of domestic value-added. This made Suzuki build and develop a domestic network of supplier industries right after its emergence in Hungary.

The majority of serial fixtures are imported from other countries through the branch's relation with its parent company. Nevertheless, the high import rate of fixtures characterises not only foreign-owned companies but Hungarians as well. At Rába the share of acquisitions from West-European and North-American suppliers is 50% as buyers' qualitative demands require such brands of specific materials and commodities that Hungarian companies are unable to meet.

The purpose of the Hungarian branches of foreign-owned vehicle module manufacturers having settled down in the 1990s was not just servicing big companies only but their decisions were motivated by the same reasons (favourable conditions for production, site-building) as big multinationals. Their customers are the biggest West European car manufacturers and global car module manufacturers (Mercedes, BMW, Audi, Renault, Volkswagen etc). But in the past few years the economic background of car manufacturing has started to change. While in the earlier period cheap and high-skilled labour, tax exemptions, favourable location were the key factors of site selection, today with the fading of these old comparative advantages new, other benefits are emerging originating from logistics, delivery costs and networked cooperation which should be based on a geographically more concentrated acquisition partnership system. Owing to these circumstances, during the past years several new firms immigrated into the region targeting the local market of automotive industry and this tendency seems to be growing in the sphere of small and medium-sized enterprises. At the same time this trend is slowed down by the construction of a special car industry park in the nearby Slovakia designated for hosting right that type of enterprises.

Companies coming to Hungary have no decision competences on acquisition. This is explained by the multinationals' standard application of global sourcing, locating only production, logistic and quality issues into Hungary and in this way Hungarian branches have narrow or no competences in their company's corporate strategy issues. The absence of decision competences in acquisition, development and sales issues is a strong limitation for their activity scope implanting certain dependencies into the region's economic structure. Today several big firms are trying to forestall this situation by involving domestic supplying industry and suppliers. Such an example is seen at Opel in Szentgotthárd or Audi in Győr but these efforts have achieved very little results so far. The purpose of these programmes is to prepare as many Hungarian enterprises – with adequate qualifica-

tion – as possible for successful competition in the parent company’s global sourcing tenders. The establishment of Pannon Automotive Cluster was motivated by similar to the aforementioned reasons.

Insufficient capital stock is the biggest problem of domestic entrepreneurs in joining to West European and global car and car module manufacturers. In practice these problems are experienced in the introduction of various quality assurance systems and in the fields of auditing and diagnostics. Today in car industry several quality assurance certificates are required to verify the firm’s compliance with extremely high European quality standards. For SMEs the acquisition of these certificates demands heavy developments. Besides the compliance with high qualitative and technological standards just in time production and precision are the other weak points of Hungarian firms. All these are limiting the growth potentials of intraregional supplier networks in short-term period. By following a consistent strategy and through continuous development these small automotive enterprises building themselves up almost from zero level were more successful and efficient than these big traditional Hungarian companies and have won sub-contracts from several worldwide-famed car companies (just a few to mention: Karsai Holding Rt., Borsodi Műhely Kft., Jankovits Hidraulika Kft., Rati Kft., Ratipur Kft., Macher Kft.). All these Hungarian-owned enterprises are strongly focusing on developments. It is mostly the Hungarian-owned car companies that preferably build their supplying industry on the network of domestic suppliers.

The members of the North-Transdanubian automotive cluster are maintaining an intensive export but still with a high percentage of imported components. The intensity of intraregional business relations is low but some steps have been made to involve local suppliers into production. In case of Hungarian-owned SMEs the involvement of partners located at a short distance is a dominating trend now and on customer side a growing number of Hungarian firms are receiving orders from foreign companies. The most important domestic products delivered as inputs for car manufacturing are car body elements, window glass, electronic devices, cable harnesses, safety belts and seats. However in general the intensity of labour distribution and partnership among the automotive companies of North-Transdanubia is still below the level desirable for a well-operating and successful cluster.

5.3.2 The role of innovation, research-development and training

Automotive enterprises show a great diversity in the intensity of their innovation and R&D activities. Companies employing leased labour and making profit from car module assembly only usually never or at a minimum level invest into R&D. Companies with leased labour have no development plans at all but in case of subcontracted manufacturing the development of production processes may be an

important issue but developing own product brand is also missing from their palette of activities.

Today a growing number of big multinational companies are starting to replace their low-skill based assembly businesses with high added product manufacturing plants. Following Audi's engine development centre Luk Savaria, a Szombathely-based company also starting its development activities here with Magna Steyr an exclusively development oriented business in Győr and the Kecskemét branch of Knorr-Bremse, a German brake system manufacturing company also founded a product development centre in Budapest building intensive cooperation relations with the local universities' research institutes and facilities. Also an engine research and development centre was opened by Audi in year 2001 operating with a staff of 100 with the purpose of improving the synchronisation of production processes and optimizing manufacturing costs.

Automotive companies are doing their best to build good relations with universities, above all with the Budapest University of Technology and Economy, with Széchenyi István University in Győr and the University of Veszprém¹⁰ Beyond the supply of high-trained labour (providing assistance to practical trainings, the establishment of a scholarship system, practicing facilities and the development of educational background) this kind of cooperation also comprises the common solution of the technical problems of manufacturing, cooperation in development but these collaborations have not yet been established officially, they have rather an ad-hoc character. The new Research Centre of Motor Vehicle Industry Electronics and Logistics being built with a financial subsidy of 400 million HUF will probably be a great step towards their formalisation. Along with the Research Centre of Cooperation targeted at building partnership relations between large companies and the university, a new Competence Centre will be built with the cooperation of the University, the Industrial Park in Győr and the Innovation Centre targeted at facilitating technology and knowledge transfer towards SMEs.

For filling up their skilled labour reserves big companies together with higher education attach great importance to professional training. The Hungarian professional training system is not suitable for meeting the demands of big companies but this phenomenon is not limited to this sector only but emerges as a general in

¹⁰ On 14 June 2005 Audi Hungária Motor Kft was awarded in the Hungarian Parliament for its outstanding cooperation in R&D with Hungarian universities. Audi has been maintaining intensive cooperation with Hungarian universities and colleges. The company together with Széchenyi István University has launched Practicing Programme targeted at practical engineer trainings. The channels of knowledge transfer are as follows: lecture series, lab equipment, R&D assignments and scholarships for professors and students. Budapest University of Technology and Economy is another very important cooperation partner of Audi also in R&D, in training and retraining (e.g. lab modernisation with a new engine diagnostic equipment).

all fields of the economy. For these reasons some firms are trying to contribute somehow to professional training either by providing onsite practical training facilities or by handing over their machinery or equipment for educational purposes or – as in case of Audi – by participating in the preparation and launching of a new training programme (motor vehicle manufacturer). Trainings and technology development should be the ultimate priority areas of the development of Hungarian enterprises. In the last few years the core area of clusterisation is rather more facing shortages in skilled labour while Hungary has gradually lost its long-lasting competitive advantages in the accessibility of relatively cheap but high trained professionals.

5.3.3 The promotional factors of clusterisation

The presence of all the elements of the vertical system of automotive industry beginning from the largest car and global car module manufacturers down to level of small businesses specialised to a small segment of automotive industry is a positive phenomenon from the medium-term perspective of clusterisation. Along with the new branches of foreign companies the contribution of Hungarian companies to the potential automotive cluster building is fairly great as their number with companies, firms, businesses providing background industrial support and services amounts to several hundreds. By now services have been embedded into an extensive partnership system but the network of domestic suppliers – because of the absence of adequate certifications dependant from their technology development level should – should further be developed significantly. Various initiatives have been implemented so far for the assessment of their technology development progress and for the elimination of the development problems of Hungarian SME sector (see for example the initiatives of Audi, the Pannon Automotive Cluster and the Hungarian government).

Institutes of higher education (principally universities) and research institutes integrating a wide range of knowledge capacities may have an outstanding role in yielding higher value-added by stimulating continuous innovation and R&D activities. In West-Hungary Széchenyi István University in Győr is the most active player in this field having already had an extensive relation system in the earlier period of its operation and still regarding the maintenance of intensive partnerships an issue of strategic importance. This motivated the University to be one of the founders of Pannon Automotive Cluster in year 2000. Several firms have built a strategic partnership system (Audi, Rába) not only for providing better practice-oriented training facilities but also for participating actively in the R&D activity of enterprises. Along with Széchenyi University several other universities (e.g. The University of Veszprém, the Budapest University of Technology and Eco-

nomics) are participating in joint R&D projects. The researches having been made at the latter site urged Knorr Bremse, a German brake system manufacturing company to establish an own product development centre. Universities with their training facilities are significantly contributing to the supply of high-trained labour continuously needed for filling in the labour demands of the automotive sector.

The region has no research institutes directly involved in automotive industry or in any of its related fields but during the past few years several firms in the region have established their development sections (Knorr-Bremse, Andi, Luk-Savaria and Magna Steyr) that beyond the development of their own corporate products and processes might even be suitable for implementing external projects pushing in this way forward the region's industrial development process.

North-Transdanubia – as a result of the foreign direct investments of the past ten years – has become one of Hungary's most industrialised regions. This process may strongly promoted and facilitated by the partnership network of industrial parks in West and Central-Transdanubia that have full coverage within the region. By now the all the region's major and minor cities have an industrial park with excellent facilities and good infrastructure suitable for meeting the demands of foreign investors. They have become the target areas for several domestic investors in the past few years. This increased their popularity among automotive enterprises and now the industrial parks in Győr, Szombathely, Székesfehérvár, Veszprém, Tatabánya, Esztergom and Oroszlány are hosting several automotive businesses.

The foundation of Pannon Automotive Cluster (PANAC) stimulating the global collaboration of the local automotive sector – through its organisation and management functions – is another positive phenomenon. PANAC is an innovative network based cooperation of businesses and organizations with interests in the automotive industry organized on a voluntary basis, founded on mutual benefits. It is an initiative that may be regarded as a specific instrument of network-oriented regional and business development. PANAC has implemented several services for promoting and stimulating the clusterisation of automotive industry. PANAC enjoys the support of the region's automotive businesses and the local actors of (regional) economic development. The number of businesses joining the cluster is in a continuous growth and had exceeded the value of 70 by year 2004 (see *Chapter 6 Figure 9*). Cooperation with Austrian clusterisation initiatives of similar profile (e.g. in Upper Austria, Vienna and Graz) through the exchange of experiences may contribute to the cluster's successful operation and may increase the efficiency of its services. The following section is providing some information on the foundation of PANAC, on the founder organisations' structure and on the palette of services providing and to be provided by PANAC.

5.4 The competitive factors of automotive industry in North-Transdanubia

What are the major competitive factors of North-Transdanubian motor vehicle and car accessory manufacturing? How are they promoting clusterisation or to what extent are they hampering these tendencies? I would like to outline the sector's major competitive factors by the presentation of Porter's classic rhombus model (Porter 1990). A detailed analysis was shown of its relationship and applicability to clusters in my presentation of Lengyel's paper in the overview of relevant special literature in my paper's first chapter. Our analysis is focusing on the factors of market-based demand, on the background (accessory) or intermediary sectors of motor vehicle industry and on corporate strategies.

5.4.1 Manufacturing factorial conditions

From the aspect of corporate input factors the competition factors of automotive industry have significantly changed in North-Transdanubia in the past 10–15 years. In the first 4–5 years after the change of regime the region's outstanding geographical position with its good transport and communication infrastructure were the key sources of development in the automotive sector. This could not have taken place without the old traditions of engineering and motor vehicle manufacturing and without the abundance of high-trained and cheap factory workers having lost their job during the crisis of machine industry. Because of the diverse geographical location of the supplier and satellite firms of Rába and Ikarus they were available and ready for work through the whole region of North-Transdanubia.

The position of the labour market of automotive industry is quite contradictory. The workers' professional skills are on a higher level than the Hungarian national average but the majority of workers is employed in production-line manufacture. Being a traditional industry the wages in this sector cannot be regarded as high especially in comparison with jobs in Budapest, in service sector or in computer industry. The knowledge intensity of manufacturing in the region may be regarded as average. At the same time today this sector is facing growing shortages of high-skilled labour which has increased the gravity and commuting zone of major automotive employers to a radius of 50-60 kilometres. Shortages in skilled labour are one of the major factors responsible for Hungary's and its greater region's losing the competition for the investments of the world's leading car manufacturers. Therefore, the immigration of big companies and their creating several thousand new jobs for the region is unlikely in the near future. Shortages in skilled labour have negative impacts on the long-term development strategy of

companies either. In the future this factor will significantly contribute to the immigration and development of SMEs employing a relatively small staff but manufacturing high value-added products.

However, labour shortages may also positively affect clusterisation making automotive companies compete with each other for skilled workers. This can be verified by the flow of practical experiences, knowledge, information and skills among these companies. Now we can declare that the mobility of labour, principally in the sphere of medium and bottom-level managers is the primary indicator of the knowledge and information transfer of clusterisation in North-Transdanubia. From the two major trends of the mobility of labour one is the migration of low positioned workers from small businesses towards modernised, complex technology-based ventures offering the perspectives of promotion in some cases. The other is the migration of medium-level managers with high skills, many years of experiences and wide contacts from large and medium-sized companies to smaller businesses.

Along with labour market issues the improvement of the general economic background of production was continued by creating a milieu capable for meeting the specific demands of automotive sector. Along with industrial parks, innovation centres, general business development services this milieu will comprise new organisations and services such as the Pannon Automotive Cluster (for detailed information see the following section), the new Research Centre of Cooperation in Motor Vehicle Industry, the Competence Centre of Mechatronics in the Industrial Park of Győr by the initiative of Győr Innovation Centre and a plan of an automotive supplier park. These new services and organisations are generated by the sector's spatial concentration and specialisation and by the demands of the emerging new businesses just in the same way as specified in our description of the 3rd and 4th phases of clusterisation.

5.4.2 Market demand conditions

Market demand conditions – as it has been described in the previous chapter – can be analysed by the quantitative indices of demand (market size and growth speed), by the quantitative parameters of local demand (the segmentation and the complexity of demands, the number of customers) and by the expectations of domestic and high quality demanding end users. From the aspects of demand clusterisation has fairly good perspectives in the North-Transdanubian region as on the one hand primary and secondary suppliers (car component, module or accessory manufacturers), big car manufacturers, final assemblers and small automotive businesses who all serve for them as a potential demand basis.

On the other hand by extending the automotive core of North-Transdanubia into a Győr-centred circular area within a radius of 400 kilometres one can see several other giant concentrations of automotive plants besides the Hungarian Audi, Suzuki and Opel. Within a 4-5 hour distance of Győr several other big car manufacturing plants are located such as Volkswagen (Bratislava), Renault (Slovenia), Opel, BMW and Mercedes in Austria, the affiliates of Peugeot, Citroën and Toyota in Slovakia and the Czech Republic, the new plants of Hyundai-Kia in Slovakia and Hyundai in the Czech Republic being now under construction. The Czech Skoda Company is not located too far from the edge of this circle either. Owing to the recently emerged and quickly growing output of car industry in the near future by year 2006 4.5 million personal cars will be manufactured annually in East Central-Europe. Of them 900 thousand will be produced within a 120 kilometre radius of Győr. The scale of potential market demand in engine manufacturing will even be larger as by year 2006 within a 300 kilometre radius the potential volume of engine manufacturing will approach 3.5 million, with an output capacity of 2.5 within a 160 kilometre radius from Győr. The majority of these capacities immigrated into North-Transdanubia in the past 10–15 years and produced enormous growth dynamism. An analysis of car manufacturing plants (Mercedes, BMW, Toyota and Volkswagen) reveals that qualitative expectations and complex requirements have high representation in demand factors.

Due to these circumstances more and more can be heard of the rising of an ‘East Central-European automotive cluster’ which on one hand may be interpreted as an eastward expansion of South-German automotive concentration but on the other hand giant multinational car companies (principally Japanese, South-Korean, French and American automotive syndicates) and the strengthening local engineering businesses play an increasing role in this process. This emerging new potential East Central-European automotive cluster may cover the Austrian, Czech, Slovakian, South-Polish and North-Hungarian industrial districts.

Multinational companies imported new technologies into clusterisation cores but they have not yet integrated into the local and regional economy. Furthermore, they are still collaborating with their old, West-European suppliers and involve a very low percentage of Hungarian or North-Transdanubian businesses into their supplier network. This goes back to several reasons. The immigrating multinational firms started to build their Hungarian supplier networks in varying sizes. It was Suzuki that has built the largest Hungarian network of suppliers producing now value-added products and services in a rate of over 35%. This figure at the other three companies – in spite of all efforts – is below 10%. Only Rába and Ikarus have real chances to be employed as primary suppliers for multinational companies but small-scale businesses may rather function as secondary or tertiary suppliers only.

5.4.3 Supplying and complementary industries

The intensity of cooperation between enterprises of the same value chain in manufacturing and development is still low. Several other industries of the region may directly or indirectly be involved into car module manufacturing (e.g. electronic, synthetic material, glass industries etc.). Although very few partnerships have been established with universities and knowledge intensive business service providers several positive practices may be cited as examples for their good performance. One of the major reasons for the stagnating of partnerships is the entrepreneurs' still high suspicion in other businesses' honesty and fairness.

In the past few years several initiatives have been launched for fostering businesses to provide higher value-added products and services and now they are starting to yield results and be implemented now. One of them is the Automotive Supplier Park project planned to be implemented as a green field investment at the Industrial Park of Győr with the support of Pannon Automotive Cluster. The park will provide a site and physical infrastructure facilities specifically for background and complementary industries and for primary, secondary and tertiary suppliers. The fact that additional automotive (car manufacturing) capacities have been and will further be built not only in North-Transdanubia but all around in the neighbour countries of East Central-Europe within an easy reach of Győr (Bratislava, Trnava, Nitra) further increases the Park's importance and opens bright prospects for the automotive industry of North-Transdanubia.

The Mechatronic Competence Centre operating on the basis of the wide-scale cooperation of the region's different automotive businesses has been established in the institutional framework of the Győr Industrial Park's Centre of Innovation and Technology with the sponsorship of Széchenyi University and the cluster organisation with the purpose of creating high value-added supplying industry. The Competence Centre has a mission of classifying the competences of different organisations of automotive and engineering industries and making them accessible for SMEs so as they increased their innovation skills and competitiveness. Unlike the Competence Centre which is now in the planning phase yet the Research Centre of Cooperation in Motor Vehicle Industry, Electronics and Logistics is now under construction and can be realised through the partnership of Széchenyi University with the greater region's big and medium-sized enterprises. The Research Centre of Cooperation has been established for coordinating R&D between big companies and universities, for transferring of R&D results into practical applications and for stimulating synergy between higher education and real economy.

5.4.4 Corporate strategies

In North-Transdanubia about 200–250 enterprises are engaged in automotive industry in direct way. Most of them are SMEs employing a staff of 50–60 but some of them are bigger. North-Transdanubian automotive enterprises are strongly specialised. The majority are focusing on car module or accessory business very few are manufacturing a wider palette of products, product families or brands. The most typical product families are engines, gearshifts, cylinder heads, exhaust pipes, alloys, cable bundles, seats and door locks.

Two groups of motor vehicle manufacturers exist in North-Transdanubia. One is foreign-owned final product, module and car accessory manufacturers, in most cases their production line is equipped with top level technology and advanced infrastructure and they have substantial amount of capital resources for the further modernisation of their plants. The second group consists of Hungarian businesses – not only SMEs but big companies as well – continuously hit by the scarcity of capital resources, who cannot afford spending their resources for modernisation needed for meeting those quality standards that are essential for their entering into partnership with multinational firms. The Hungarian supplier network is characterised by old fashioned technology, small-scaled and fragmented capacities low value-added products and services low complexity products and minimal affinity for partnership and cooperation. Therefore, the majority of domestic enterprises are unable to compete with foreign-owned firms emerging on international markets. Unfortunately the majority of Hungarian SMEs are operating without even a medium-term strategy focusing on daily survival only.

The region has no independent R&D organisations, institutes or companies though – as it has already been said – certain companies are doing some efforts to establish R&D centres in Hungary. With the region's changing potentials the earlier strategies based on low labour, site building and maintenance costs are under revision now giving a way to new priorities as increasing value-added product manufacturing and gaining the comparative advantages of logistics, partnerships and supplier networks. From the series of examples demonstrating this trend the emergence of development activity¹¹ or the initiatives for the assessment and development of domestic suppliers (Suzuki, Audi, Opel) are notable. Foreign-

¹¹ In year 1999 the Kecskemét branch of the German Knorr-Bremse brake manufacturing company built a product development centre in Budapest. The centre is actively cooperating with the local universities' research staff and services. The activity scope of Audi in Győr was extended by engine development and an engine development centre was built for this purpose employing 100 engineers for research. In year 2002 Luk Savaria also built a development centre and the Austrian Magna Steyr company migrated a development plant into Győr because of the high concentration of automotive industry. Several other automotive businesses have similar intentions concerning their product development.

owned companies are strongly export-oriented while Hungarian firms set partnership building with Hungarian branches of multinationals their primary objective. Competitiveness is based on low labour costs and other production elements. New enterprises are still immigrating into the region. This may positively affect the long-term local competitiveness of firms and also the intensity of their clusterisation.

5.5 The Central European automotive cluster

Of the new enterprises founded by German automotive suppliers more than one quarter are located in the East Central-European region. Although the contribution of East Central-European countries to the development of European automotive industry is low the role of automotive sector is still high in their domestic industry and national economy. In the Czech Republic the contribution of automotive industry to of total value-added industrial production is 10.8%, in Hungary 10.1% and in Slovakia it is 8.2%. Considering that in these countries the majority of new businesses are profiled in assembly with low value-added products and services their contribution to domestic sales and exports is even higher (*European Competitiveness Report...*) (Table 4).

Table 4

Some major indices of the region's automotive industry

Country	Number of employees, people	Sales revenue, million EUR	Investments, million EUR	Personal cars, items*	Trucks, vans, lorries, items*
Austria	38,100	10,400	977	118,650	47,650
Czech Republic	98,061	12,661	697	436,297	5,422
Hungary	32,843	6,765	1,003	122,338	3,778
Poland	74,400	7,749	518	306,847	15,214
Romania	45,551	405	88	75,706	19,546
Slovakia	50,200	4,334	565	281,160	187

* Data of year 2003.

Source: The author's own edition on the basis of OICA data.

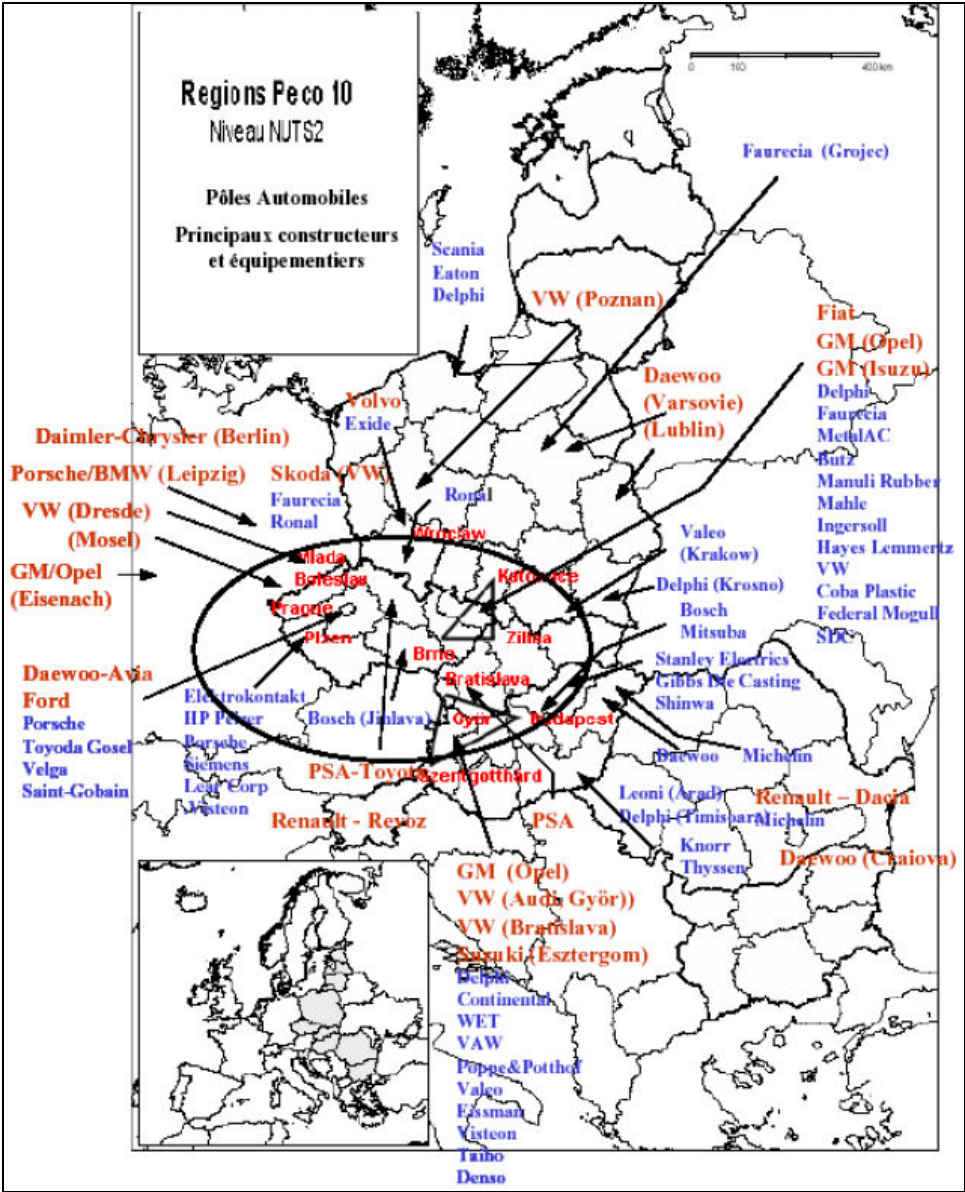
As it is written in European Competitiveness Report an automotive development pole has been emerging in Central Europe which comprises some areas in the Czech Republic, the major parts of Austria (Lower and Upper-Austria, Styria) the suburban zones of Katowice and Krakow in Poland, Hungary's northern parts (North-Transdanubia, Budapest, the North-Hungarian region). At its earlier stage the investments of German automotive firms dominated the region (the emergence of WW group, Opel with its extensive supplier network) but today a growing number of French and East-Asian automotive firms are coming to Hungary (Peugeot/Citroën, Toyota, Hyundai who will be followed by their supplier network).

In some countries the total vertical system of automotive industry has been built up. As the Czech example is demonstrating the immigration of purely assembly and car manufacturing lines has been followed by high-trained manpower and advanced technical/technology infrastructure supporting researches. The spatial concentration of automotive sector in North-Transdanubia has approached such a level when along with the existing factors of attracting new businesses into the region – such as the comparative advantages of geographical location, advanced technical infrastructure, state subsidisation – the density of automotive companies, their concentration, the increasing potential and existing supplier capacities, the better utilisation of vendor-customer contacts and the intensifying partnerships become further driving forces for the start-up of new automotive businesses. From this aspect it is useless to differentiate the countries of Central European automotive clusterisation because the whole region can be interpreted as a homogenous development pole of automotive industry. Today the growing scale of cooperation networks in automotive industry makes it difficult to separate Czech, Slovakian or Hungarian automotive industries from each other as they are maintaining contacts with the same actors of automotive industry and the ties they are bound to each other are getting stronger. The opening of new manufacturing plants in Slovakia will intensify this process as their new factories in Trnava and Zilina are located at almost equal distance from North-Hungary and South-Poland who may be the potential suppliers of their background and complementary industries.

Just as if to verify this theory Sungwo Hitech a South-Korean supplier for Hyundai Motor and Kia Motors is building a new car manufacturing plant with an investment of 2.5 billion Czech Crowns (106 million EUR) in Ostrava a city at the Czech and Slovak border for the support of Kia Works being under construction in Zilina with an investment of 1 billion EUR. The company's decision was motivated by good infrastructure and the availability of high-trained labour in the Czech Republic (*Figure 6*).

Figure 6

The concentration of automotive industry in Central Europe



Source: European Competitiveness Report (2004).

Analysing the development of automotive industry from the viewpoint Győr or the North-Transdanubian region from the aspects of the spatial concentration of domestic automotive sector it seems that the capacities of West-Slovakian automotive plants are offering favourable prospects for Hungarian automotive enterprises in North-Transdanubia. Considering geographical proximity (100–200 kilometres) and good infrastructure facilities in West-Slovakia a city like Trnava may be a better alternative for Peugeot/Citroën Company than East-Hungary (Figure 7).

The greatest challenge for domestic automotive industry, principally for automotive companies and car module manufacturers is how they can cooperate with giant car manufacturers who may become their potential market at a distance of 100–200 or 300–400 kilometres from them, how may benefit from the potential advantages of clusterisation and how may foster its further development so that the sector may really become the European pole of development capable for tackling its South-East Asian competitors.

Figure 7

Car manufacturers in the environment of Győr and Audi Hungária Motor Kft.



Source: Pannon Automotive Cluster 2004.

6 The Pannon Automotive Cluster (PANAC) initiative

During the clusterisation process of the North-Transdanubian automotive industry the territorial concentration of enterprises within the region was followed by the emergence of special services customised to the demands of automotive industry. Of them Pannon Automotive Cluster (PANAC) initiative has an outstanding role in the automotive sector. This is an organisation with own corporate and management system to further catalyse this clusterisation process through its special services and activities with the purpose of transforming this developing cluster (as classified by literature) into an operating cluster, capable to utilise the positive effects of clusterisation in their full dimensions within the shortest period of time. This section is going to provide a detailed presentation on the historic background of this initiative, its activities for the promotion of clusterisation and its palette of services so as to see what cluster-specific services are available within the region now and to evaluate the initiative's role in clusterisation process.

6.1 The foundation of PANAC initiative

In Hungary the idea of an automotive or motor vehicle industry cluster was born at the end of year 1999 for the first time. It was formulated by some local policy-makers and politicians on the basis of a study trip to the Upper-Austrian Automotive Cluster (Automobil Cluster Ober Österreich) in Linz (see *Grosz* 2000 for details) where they could learn its activities and operation. By recognising the potential advantages of an emerging networked cooperation system of a similar type in North-Transdanubia the largest car manufacturers (Audi, Opel) became the parent organisations of this initiative. They were soon followed by Rába in Győr which – on the basis of its active participation in a supplier programme with the coordination of MVA [Hungarian Business Development Foundation] – had already had some experiences in the field of supplier chain management.

This cluster initiative won significant political support along with economic sector from the associations of automotive organisations, from the region's business development agencies and from the West-Transdanubian Regional Development Council and its working organisation under the name of West-Pannonian Regional Development Agency having been established on the basis of the Parliamentary Act on Regional Development and Physical Planning passed in 1996 amended in year 1999. During the preparatory phasis of PANAC a comprehensive survey was carried out by Ipargazdasági Kft. (*A nyugat-dunántúli járműipari vállalkozások...*)

The survey covered the whole area of West-Transdanubia but excluded Budapest-centred companies. The survey covering 150 companies of the automotive

and background sectors was aimed at informing them on the cluster initiative and its purposes. Moreover, the survey collected the primary data of automotive businesses, assessed the potential needs for future cluster services and cooperation project initiatives and on the basis of results it formulated a proposal for concrete cluster services. The survey categorised enterprises into two groups (vehicle industrial suppliers and priority vehicle industrial suppliers). Except for some elements the questionnaire had similar questions for both categories. The majority of enterprises gave positive feedback for the initiative and almost all of them indicated their will of joining the initiative (*A nyugat-dunántúli járműipari vállalkozások...*).

Following several coordination processes with regional top manufacturers the cooperation agreement on the foundation of Pannon Automotive Cluster (PANAC) was signed at the end of year 2000. The Ministry of Economy (today named as Ministry of Economy and Transport) joined to the Cluster as an external co-financing agent. The diversity of the participators' interests partly eases and partly makes things difficult for PANAC. Along with vehicle and component part manufacturers (Audi Hungaria Motor Kft., Opel Hungary Autóipari Kft., Magyar Suzuki Rt.,¹² Rába Járműipari Holding Rt., Lux-Savaria Kft) additional members joined the cluster such as the representatives of financial sector (Citibank, HVB Bank), West-Pannonian Regional Development Agency as a major actor of regional development and also of local and regional economic development and Ipargazdasági Kft as a consultant. The entrance of Széchenyi István University, the region's most important institute of technological higher education operating as a university since 2002, into the cluster as a founder is another major event. Siemens Rt and Fiat Worldwide Purchasing Rt were also among the founders of PANAC.

The Cluster Management is responsible for operative actions and for the coordination of operative services incorporated into West-Pannonian Regional Development Agency as a special division operating in an independent economic accounting system. Founders are entitled to bring decisions over fundamental strategic issues. Cluster Committee is the major forum of decisions composed of the founder, later joined enterprises and organisations and a representative of the Ministry of Economy. *Figure 8* is demonstrating the cluster's corporate scheme.

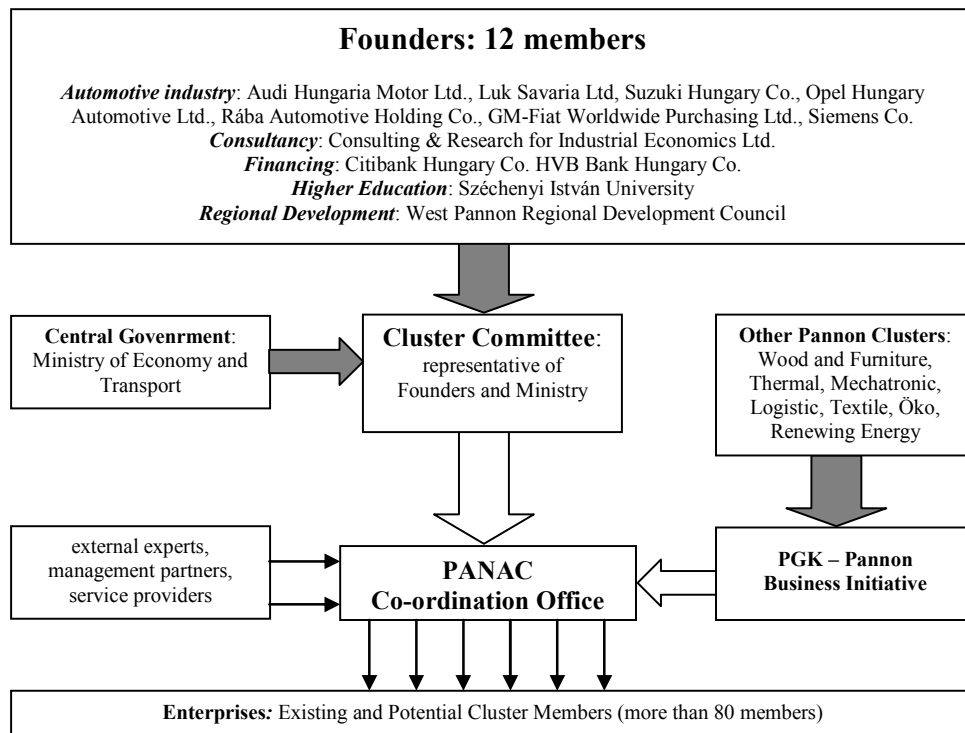
Besides founders and joined members marking up the strategic directions of cooperation associated members are the primary beneficiaries of the initiative.

¹² Magyar Suzuki Rt not only joined PANAC initiative as a founder but also contributed to the organisation of Xentral-Hungarian Automotice Cluster (Esztergom Cluster) aimed at improving the competitiveness of SME sector, at the coordination of development on the basis of the infrastructural facilities of Esztergom Industrial Park and at the deployment of Suzuki's business partners into the park. For this reason this may rather be regarded as a Suzuki-centered local supplier network than a regional cluster.

The accession to the initiative (partner membership) is not limited by any special conditions. Enterprises agreeing with the initiative's objectives and wishing to use its services – from any part of Hungary – may become members upon the payment of a single registration fee and an annual service fee.¹³ However partner membership is limited to manufacturing capacities seated in Hungary and to functioning as manufacturer. A special registration mechanism operates for commercial and service companies who will be recommended to partner organisations upon registration.

Figure 8

The corporate scheme of PANAC



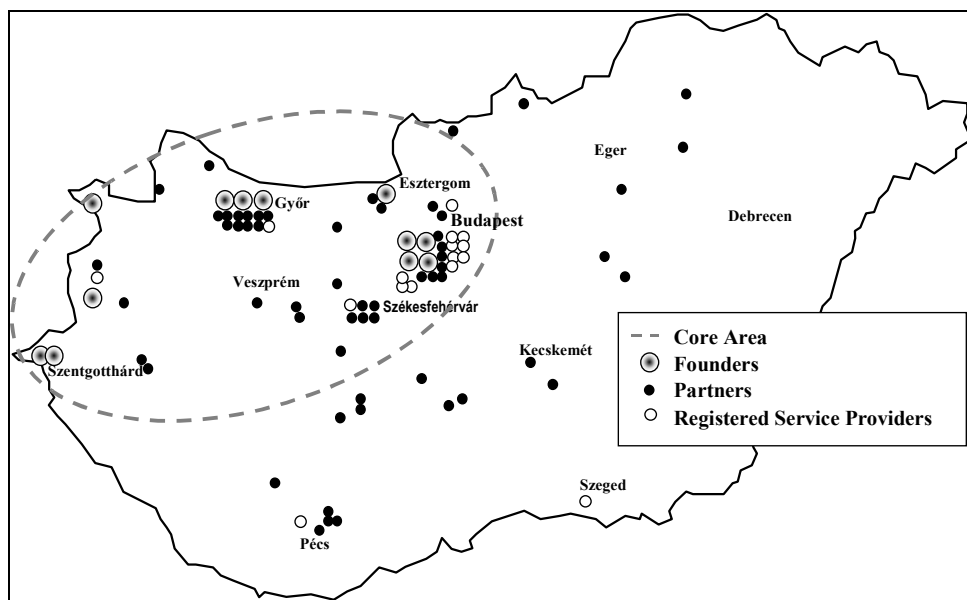
Source: The author's own edition.

¹³ 30,000 HUF one-time registration fee should be paid by small- and medium-sized enterprises while private businesses should pay double of this sum amounting to 60,000 – HUF. The registration and cluster database entrance fee for commercial and service companies is 100,000 HUF. The annual service fee for all types of economic organisations has been set to 30,000 HUF alike.

Pannon Automotive Cluster sees the cluster as a trusted partnership system. In this sense its operation is based on the distribution of information and knowledge on the grounds of mutual benefits. In the first year of its operation of PANAC was focusing on the introduction of its initiative in a greater public, on advertising its activities and services for potential business partners and on increasing the number of its membership through several events, and meetings. As a result, by now 70 members have joined the initiative which currently has nearly 80 members now as a total (Figure 9).

Figure 9

The geographical location of PANAC members in year 2004



Source: The author's own edition on the basis of data provided by PANAC.

The weight of the nearly 80 members and PANAC itself is illustrated by the number of staff they employ. In year 2004 it was about 38 thousand and it is a very high figure considering that the total number of jobs is 50 thousand in the Hungarian automotive sector. Being aware of the fact that any business organisations can participate in the cluster initiative without the necessity of choosing automotive industry as a main profile (e.g. synthetic material industry, metal processing etc.) this is still an outstanding value. The data of participating enterprises show that the members' total annual sales revenue amounts to an approxi-

mate value of 5 billion euro. Naturally, the majority of this sum is earned by the largest car manufacturers (Audi, Suzuki and Opel). Two-thirds of PANAC members are producers and manufacturers but 27% are running R&D services, which is very important from the cluster's future perspective. The pattern of the PANAC partner organisations' size category may be regarded as typical. 29% are large companies, 34% are medium-sized enterprises and 37% are small businesses employing less than 50 personnel. Today, partly owing to the various services, training and consulting activities of PANAC – the members' competence in quality-related issues (disposition of quality assurance certificates) is by far above the Hungarian average.¹⁴

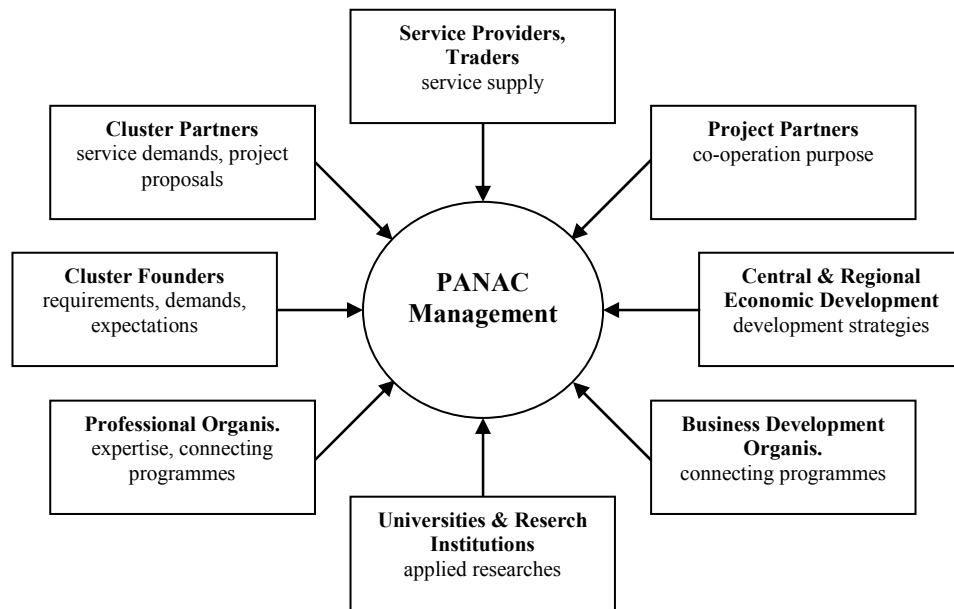
Cluster members, associated organisations and institutes as project partners collaborating in cluster services and common projects, research institutes of basic and applied research, universities (e.g. Széchenyi István University), professional organisations (e.g. MGSZ, MAJOSZ etc.), the regional-level representatives of business development sector (MVA, IDTH, Chambers etc.) through their joint programmes, and the key actors of central and regional economic management through the realisation of development concepts and programmes (see *Figure 10*) are all functioning as further connection points for the initiative, for the management and members of cluster.

At present the funding of PANAC's functional operation which is closely linked with the accomplishment of operative tasks is the initiative's most serious problem. As cluster membership fee is only a minimal cost for enterprises and founders pay no charges at all, only very low resources are available to be spent for services. Only two organisations, the Ministry of Economy, supporting the cluster from the very beginning, and the West Pannonian Regional Development Agency provide some financial contribution to the cluster's budget. Despite cluster development issues enjoy priority in local, regional and the central government's development policies in the past few years the financing problems of cluster initiatives still have not been tackled. No appropriate instruments have been assigned to objectives. As it is seen from foreign examples, these types of organisations need financial subsidisation during the first years of their operation and they may become self-sustainable only at the medium stage of their evolution process.

¹⁴ 55% of producer enterprises has ISO 9001, 40% has ISO9002 and 40% has QS9000 quality assurance certificate. Several members have ISO 14001, TS19469 and VDA 6.1 certificates.

Figure 10

PANAC and its network of associated organisations and institutions



Source: The author's own edition on the basis of PANAC.

6.2 The services of PANAC

PANAC – as it has been described in the foundation document – has a mission of integrating foreign big multinational car manufacturers and small car component businesses into the economy of the region and of East Central-Europe with the establishment of a dynamic and innovative cooperation network of automotive industry on the territory of Transdanubia. The initiative's missions have been set up as follows:

- Supporting the localisation of production and development of modules and systems,
- Improving Hungarian-owned suppliers' ability to produce and develop high complexity systems and parts,
- Improving the ability of Hungarian research communities to be involved in automotive (international) projects.

PANAC's primary objective is developing the professional skills of suppliers to be ready for integration into the global network of suppliers. PANAC's another priority is providing professional assistance for partners so as to enable them for manufacturing more complex and knowledge intensive products, hereby improve their positions in the supplier chain. The fostering of a nation-wide automotive strategy and developing the initiative into a reference-provider organisation on the partner companies (both to the government and domestic or international buyers) is an additional objective of theirs.

In year 2000 before the foundation of PANAC a detailed service had been prepared for the commission of West Pannon Regional Development Agency on the basis of an assessment of the automotive enterprises' demands. The service plan was targeted at identifying the major categories where potential cluster members would need help and assistance from PANAC. The replies of the interviewed enterprises covered the following categories (*A nyugat-dunántúli járműipari vállalkozások... 2000*):

- Organisation and collection of tendered subsidies and low-interest rate circulating capital credits;
- Dissemination of information on a periodical basis (business, market, capital investments, partnership, tendering, legal etc.);
- Partnership organisation, partner finding services;
- Technology centre facilities for production support and quality development and documentation (calibration of measurement and analytical devices, special laboratory analyses etc.);
- Assistance to partnership projects for increasing the efficiency of production (designing common manufacturing projects, shortening the duration of delivery).

On the basis of demand survey and the long-term experiences of similar cluster initiatives in other countries PANAC has plans for introducing the following services for its members (some services are already in operation now while others are scheduled for a later time).

6.2.1 Providing training and specialist training projects

The preparation and organisation of training programmes for the management of enterprises having joined the cluster for teaching everyday management (controlling, benchmarking, TQM, KVP etc.) and human resource management skills. Several workshops have been organised with the assistance of multinational companies and available free of charge for cluster members in various fields as quality assurance, logistics and corporate management. The cluster also runs a special

customs administration training course at a flat charging rate. A special training course is available for the graduate students (mechanical engineers, transport engineers and technical managers) of Széchenyi University at the cluster's partner organisations. Audi has built and opened its own training centre in year 2001 providing valuable training services. Of them perhaps the events of the supplier development programme of the past few were the most important but the supplier chain management and project management training programmes held by foreign lecturers with customs specialist trainings are also worth of a note.

6.2.2 Providing specialist events

PANAC sets providing specialist programmes and their availability for enterprises a priority as they may contribute to the establishment of new partnerships or to the penetration of new pieces of specialist information. To achieve these targets PANAC has an important role in the organisation of professional displays, fairs and in encouraging enterprises to participate on them. PANTECH automotive exhibition and conference organised by PANAC was held in 2004 in Győr for the first time. Before PANTECH PANAC had already participated at a suppliers' display and fair held in Budapest in year 2003 and also had some role in the organisation of International Automotive Forum, a professional conference held in Győr twice. PANAC was involved in further programmes under various topics as well, such as the impact of the European Union's environmental standards on automotive industry or in special events having held under the general theme of green technologies. Additional successful programmes have been organised and completed with the involvement of international partners in such issues as the logistic demands of global sourcing, the practical application of CATIA – CAD/CAM design programmes and the managerial issues of supplier chain operation. Along with professional training programmes several international study trips to cluster initiatives or multinational companies of similar profile have been organised into various countries as for example Germany, Austria and Japan.

6.2.3 Providing information and communication services

Compilation of databases and the dissemination of their data (PANAC members, the most important automotive R&D service providers, institutions for training and education and other servicing firms). These databases are facilitating inter-company communication and easing cooperation partner finding for projects. For fostering cooperation a common database is under preparation. Now a website (www.autocluster.hu) is available as a primary means of communication where along with the current news of the automotive sector various pieces of informa-

tion are provided on the cluster's services. Professional forums, program offers and several other useful links are helping the orientation of partners. Later on further databases will be built. Onsite factory visits are fostering the establishment of direct contacts.

6.2.4 Providing diagnostic and consulting services

Technological, organisational and financial assessment of cluster members for identifying their potentials and the necessary interventions for becoming a supplier. Providing continuous consulting and expert services for members. The corporate diagnostics based on the members' requirements and current international standards is compulsory for all members and this procedure is automatically completed on the entrance of a new member. Diagnostic processes are serving as a basis for the determination of the members' supplier profile. The further enhancement of diagnostic assessment and the members' participation in international projects demanded the introduction of a benchmarking programme. This programme comprises the setting up of Benchmarking Club issuing semi-annual reports on the benchmarking of 23 enterprises.

6.2.5 Providing technology transfer services

This comprises the provision of various Technology Centre services for members on discounted prices. Services are based upon the region's existing capacities. Of them the testing centre of Széchenyi István University with TÜV Rheinland accreditation providing mechanical and destructive-free materials testing and three-dimensional measuring facilities has the greatest importance. The University is also cooperating as a partner in CAD/CAM planning, in mechanical system designing and testing, in factory and manufacturing system drafting and in several other projects, while INNONET Innovation and Technology Centre's computer lab is open for members with error and impact analysis and metering/device testing facilities.

6.2.6 Providing marketing and PR services, internationalisation

This comprises regular information disclosure in quarterly bulletins on the members' major investments, activities, successes, planned or ongoing common projects, professional meetings, events and actualities. Reports on professional meetings, seminars and workshops organised by the cluster management. Maintenance of continuous contacts with press and advertising media both in Hungary

and the neighbour countries. As a result of marketing and PR activities several articles have been published about the initiative. The image and representation of PANAC in international environment. Participation in international events. Support provision for members to participate in international fairs, displays. Networked cooperation with similar foreign automotive initiatives. PANAC has outstanding relations with Automotive Cluster Vienna Region (ACVR) participating in joint project with Upper-Austrian AC, with ACstyria Autocluster GmbH in Styria, with the German AKJ-Automotive, with the French ARIA Cluster for Nord Pas de Calais and with several other German research institutes and universities. To maintain an efficient exchange of practices on international level PANAC with German and Austrian automotive clusters is participating in the establishment of the Association of European Automotive Clusters.

6.2.7 Fostering cooperation and development capital

This comprises assistance provision to cooperation project preparation, development and financing, especially in the areas of R&D, joint manufacturing processes, quality development, logistics and acquisition. Assistance to partner search with the help of common database, system database and Internet. There is a plan for the provision of financial assistance to the implementation of joint development drafts and projects with the involvement of at least three partners targeted at fostering cooperation. Today the cluster's financial position is too weak for the direct financial subsidization of concrete projects but may give support to partner organisations with a continuous monitoring of tenders and tender consulting services (e.g. the tenders of the Ministry of Economy, R&D funds of the Ministry of Education, tenders of the Regional Development Council's preliminary regional development programme etc.).

7 Conclusion

After the presentation of the features of clusters having been emerged as products of the growing territorial concentration and cooperation systems, our objective was to investigate the practical utilisation and application potentials of the theoretical interpretations of clusters which requires a policy-oriented approach. Namely, how is it possible to facilitate the establishment, the natural evolution and development of clusters by political interventions? This question raises two interrelated problems serving as a standpoint for the applicable methodology in research, the research process itself and influencing its results at the same time.

While the interpretation of regional cluster in literature is originating from the conceptualisation of region as a node-like formation without definite borders and institutions, functioning rather as a power centre whose existence is based upon the intensity and geographical dimensions of economic relations and cooperation, the application of cluster-oriented policy – due to the necessity of establishing and operating a relevant system of instruments and institutions and to the essential preconditions of measuring their performance – in the majority of cases cannot be abstracted from a concrete political or at least a development or planning-statistical region marked out by definite borders.

At the same time cluster development – in contrast with theoretical approach that is not associated with organisations – in several cases demands the establishment of an organisational framework, the foundation of new institutions, organisations bearing the name of cluster and also a substantial subsidisation of their services, at least at the initial phase of their operation and the active collaboration of policymakers.

Automotive industry with its automotive supplier sector is an explicitly and highly concentrated formation in Hungary. This is all true for the number of enterprises (especially for the foreign investments within the automotive sector) but analysing the volume of production with the specific index of manpower employed within this sector we can conclude that in Hungary the core area of automotive sector is located in North-Transdanubia – namely in Győr-Sopron, Vas, Komárom-Esztergom and Fejér counties. This concentration level of automotive industry as a critical mass may provide a perfect basis for the formation of the domestic automotive cluster.

It should also be cleared that although clusterisation process has achieved the greatest advance in the automotive sector in Hungary its development stage is still far below the level of an advanced, well-functioning automotive cluster. It should rather be considered as a potential cluster having the majority of elements needed for successful clusters but these elements should be further consolidated and extended so that they could elicit significant positive agglomerative and synergic effects.

This is explained by the low intensity of supplier and R&D collaboration and common innovation projects between the newly established and operating businesses in the region, by the trifling scale and intensity of cooperation between economic actors, scientific research institutes and universities and by the inadequate flow of information and knowledge resulting from the aforementioned deficiencies of cooperation relations. The global sourcing of foreign companies makes the job of Hungarian enterprises very difficult to get into the team of their suppliers. The demand for domestic R&D results or activities is also moderate only.

It is a big problem that the regional basis and the strategic competences of the sector's most outstanding German, Japanese and American companies are located outside the region. This is a partial explanation for the aforementioned problems and deficiencies but also calls attention for the dangers these enterprises' relatively quick outmigration may bring about. For decreasing the degree of the region's economic vulnerability strengthening the competences and generating a critical mass of domestic automotive industry and enterprises that may serve as a real basis for cluster-based development are issues of elementary importance.

Meanwhile several positive processes have started in several fields bearing the marks of clusterisation. The cooperation between institutes of higher education was continuously getting more and more intensive during the past few years. Széchenyi István University joined Pannon Automotive Cluster as a founder and continuously extended its economic relations and treats its relationship with Audi as a matter of special importance. A Motor Vehicle Logistic Cooperation Centre was opened under the university's auspices after a survey on the sector's demands with a special target of intensifying the relationship between university researches and the North-Transdanubian automotive industry. Along with Széchenyi István University the Budapest University of Technology and Economy is bound to automotive industry with strong economic ties and to some extent the University of Veszprém as well.

Mechanical engineering, namely motor vehicle industry looks back to a long history in the North-Transdanubian region. These old traditions and innovative background predestine the region and its automotive industry to put the existing and future networked partnerships into the centre of its development and competitiveness increasing strategy. In this sense for the settlement of newcomer automotive suppliers and for the improvement of input-output connections within automotive industry an Automotive Supplier Park and a Mechatronic Competence Centre will be established in Győr. Along with these projects several other initiatives and services have been launched during the past years targeted at satisfying the specific demands of this very formation in automotive industry.

Various trends may be observed in the economic activity of companies showing towards clusterisation. With the changing regional economic environment the earlier site selection strategies based on the competitive advantages of low manpower and plant establishment costs were replaced by new ones originating from the competitive advantages of logistics, cooperation relations and the building of supplier networks. The progress having been made so far may be illustrated by such examples as the emergence of development profiles (Knorr-Bremse: product development centre, Audi: engine development plant, Luk-Savaria: launch of development profile, Magna Steyr: development centre, WET Automotive: RCD centre) or initiatives for assessing and supporting domestic supplier firms (Suzuki, Audi, Opel).

And last but not least, clusterisation may significantly be promoted by the establishment of PANAC, a specific cluster development oriented cluster organisation founded by enterprises and by its consistent cluster building strategy. We are aware that the intensity of PANAC's activities compared with similar foreign organisations is too low for achieving significant results in clusterisation even in medium-term perspective even if the shaping of its service profile derives from the assessment of the demands of Hungarian enterprises and from the experiences of PANAC's Austrian and German partners.

Despite long-term involvement policy in automotive industry may bear some risks in the region due to strong dependencies but the so far achieved results, the future potentials of automotive industry and the ongoing processes of global economy (big automotive investment projects within a radius of some hundred kilometres) are justifying the necessity of further steps towards a modern automotive and automotive component part cluster. For the minimisation of structural threats and for strengthening economic diversification a similar cluster-based technology should be introduced in other economic sectors as well as it has already started in timber, furniture and spa tourism.

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