AutoNet

FRAMEWORK POLICY DOCUMENT

Notes on the Automotive industry in Central Europe:

Slovakia, Slovenia, Italy, Checz Republic, Poland, Germany, Hungary

The automotive industry is crucial to Europe's prosperity, because the EU is the largest producer of motor vehicles in the world. A large pool of skilled workforce is employed in the automotive industry, a sector playing a strategic role as key driver of knowledge and innovation.

Central Europe, in particular, is considered to have become "Europe's Detroit" with its high concentration of motor vehicles production, due to low-cost but highly skilled labour, EU membership and good transport links with the West.

The sector, though, is highly suffering from global crisis which has affected the supply and sub-contracting network, the manufacturing (motor vehicles, motorcycles and parts thereof), as well as RTD institutions that collaborate with industry on innovative projects. The negative impact is clearly visible in all European regions which appear to be seriously damaged by jobs cut, declining tax revenue, decreased production, arrest of RTD and implementation of innovation projects.

Within this framework, European Union awarded Project AutoNet, led by 9 partners from 7 CE countries, with a financial contribution to strengthen the conditions for innovation in car industry and support the relaunch of its competitiveness. In achieving this goal, part of project activities are addressed to research on framework conditions of automotive industry within relevant territories in CE and, starting from there, outline recommendations to be reported as input to policy-decision-makers in order to stimulate their action to revive the sector.

This document collects and assembly single and personal analysis conducted by each AutoNet partner: AUTOMOTIVE CLUSTER WEST SLOVAKIA (SLOVAKIA), COMUNIMPRESE SCARL CONSORTILE COMPANY LIMITED BY GUARANTEE (ITALY), BUSSINESS INTEREST ASSOCIATION ACS, AUTOMOTIVE CLUSTER OF SLOVENIA (SLOVENIA), MID-PANNON REGIONAL DEVELOPMENT COMPANY (HUNGARY), SAXONY ECONOMIC DEVELOPMENT CORPORATION (GERMANY), PROVINCE OF REGGIO EMILIA (ITALY), MORAVIAN-SILESIAN AUTOMOTIVE CLUSTER (CZECH REPUBLIC), PODKARPACKA IZBA GOSPODARCZA (POLAND), LOWER SILESIAN AGENCY FOR ECONOMIC COOPERATION (POLAND).

Each of them offer a personalized elaboration regarding the state-of-the-art of automotive industry within their territory, mapping the excellence of the region, highlighting trends and developments, focusing on needs and priorities and analysing innovation and research.

Notes on the Automotive industry in Slovakia

By Automotive Cluster West Slovakia

AUTOMOTIVE CLUSTER West Slovakia

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QUANTITATIVE AND QUALITATIVE ANALYSIS OF THE AUTOMOTIVE INDUSTRY

I. Introduction and the main features of the automotive industry in Slovakia

The automotive industry in Slovakia can be divided into three main time periods:

I. Period from the 19th century until the end of the 2nd World War
II. Post 2nd World War period and era of socialism
III. Period after the year of 1989

In Slovakia, the current automotive industry is predominantly characterized by passenger car production and represented by the presence of three global automotive companies: Volkswagen, PSA Peugeot Citroen and Kia Motors. At the same time, the automotive industry is also represented by a broad scale of global sub-suppliers of first, second and third tier as well as local companies.

Until the year of 1989, there was not an own Slovak car brand which would represent the local automotive industry.

The end of the nineteenth century has brought significant activities within the automotive industry. In 1850 was established the 3rd the oldest car maker TATRA in the world after Daimler Mercedes-Benz and Peugeot. In 1895, company SLAVIA was established by Laurin & Klement, than in 1897 company TATRA produced the first motor car in central Europe, the Präsident. At the beginning of the twentieth century Emil Skoda established new enterprise called SKODA (1925). In the post Second World War period the automotive sector of the former Czechoslovak state consisted of state automotive companies known as Škoda, Tatra, LIAZ, AVIA all managed from the headquarters in Prague. Not until the 50s Slovakia had possessed its own manufacturing capacities when the basis of motor vehicle development was founded. As a first company the Trnava based Trnava automobile factory (TAZ) was created during the 60s. However, the key milestone for the Slovak car industry was the establishment of the Bratislava automobile factory (BAZ) in 1971, which was a certain satellite company of the Czech Škoda and Tatra producers. Within its structure, BAZ had its own Department of Motor Vehicle Development employing 373 researchers and employees in the 70s. The actual serial car production was launched only in 1982 (Škoda

GARDE model) lasting till the end of 1989. After the fall of communism both BAZ and TAZ were closed down never returning into their former character.

Beginnings of the modern history of the automobile industry in Slovakia date back to 1991 when the German automotive group Volkswagen has overtaken the facilities and premises of the former BAZ automotive company in Bratislava. From this period the industry has begun to develop and eventually a sub-suppliers network was co-evolving thanks to the arrival of foreign supplier companies but also to local sub-suppliers able to fulfill the strict criteria and requirements of end producer of the vehicles.

Developments of the last twenty years contributed to the current state when there are over 200 automotive companies supplying various automotive components, modules and systems to the three global car manufacturers. From the geographical perspective, the sub-supplying networks have been naturally established in four major areas all carrying potential for doing further related business activities:

- Bratislava, the capital city region - (Base of VW Slovakia and its suppliers)
- Trnava region (Base of PSA Peugeot Citroen and its suppliers)
- Žilina region (Base of KIA Motors, VW component plant in Martin and their suppliers)
- Košice – Prešov region (established global suppliers: Getrag Ford Transmission, Magneti Marelli, Lear Corporation, etcetera)

The presence of global players in Slovakia has created a solid base for the industry's future development especially in relation to the sub-supplier sector. For the support of the automotive industry, the **Automotive Cluster – West Slovakia** has been founded in the proximity of the Trnava based car manufacturer gathering companies providing various services for the automobile producers. This way a structure of the car industry is evolving not only consisting of the global companies but also from entities familiar with local conditions and which are flexible and well qualified when reacting to customer demands.

The present automotive industry is the main driving factor behind the Slovak economy, thus its role being crucial with respect to employment, export, educational and regional development, cooperation with international institutions, cross-border cooperation, etc.

According to the SWOT analyses found in the materials of the agency SARIO, the main features of the automotive industry are listed as follows:

Strengths

- Strategic location between West and East Europe with possible development on the East
- Strong engineering tradition
- Traditionally good quality technical education and developed R&D network
- Presence of world-class automotive companies
- Favourable labour costs and high labour productivity
- Automotive Industry Association of the Slovak Republic (AIA SR) - strong and respected professional association supporting the automotive industry in Slovakia
- Growing potential of clusters initiatives

Opportunities

- New supplier opportunities due to relocation of global automotive and electronics industries towards CEE
- New opportunities in cooperation with foreign companies in development of green cars
- Opportunities for creation of cooperative networks and clusters with focus on R&D
- Support for the innovative environment in the automotive industry
- Emerging automotive and machinery/electronics clusters (North-East Slovakia) with strong domestic supplier base
- Strengthening cooperation between automotive producers, sub-suppliers, engineering companies and universities as well as the openness of universities towards cooperation with industries
- Opportunities for the creation of new applied research institutions and research institutions
- Taking advantage of research networks under the EU framework programs with strong support and interest in establishing new R&D centers

Weaknesses

- Educational system suffering from weak financing, weak involvement of private financing, weak R&D activities
- Not utilizing the R&D potential of local universities and R&D institutions
- Need to renew measuring apparatus and equipment for research and development at Universities

Threats

- Unbalanced external dependency of the automotive sector
- Automotive industry is too concentrated in Bratislava and Trnava regions causing lack of sufficient skilled labour force

Summary of the automotive industry potential in Slovakia:

- Challenge, primarily for sub-supplier companies to enter into the supplying network
- Possibility to create own research and development of local companies
- Possibility to erect a new sub-supplier network focusing on R&D and engineering services
- Design activities of university laboratories
- High-tech technologies and requirements of the three automobile companies are forcing suppliers to adopt flexibly to demands
- With outlook for five years, growth potential of car production in Slovakia could represent 600-700 thousand vehicles per year.

II. Structure of the automotive industry in Slovakia

The automotive industry is solely oriented on passenger car and component production. Kia Motors also produces motors in its plant near Žilina.

Nonetheless, regarding component production, Slovakia does have a broad range of all type of component, modules and system supplies. Within the country an interestingly diversified supplier structure is present including universities, centers of the Slovak Academy of Science and other companies focusing on engineering services. The sub-supplying sectors themselves are distinguished based on the culture of the particular car producer allowing them to divide into three cultural groups (FRA, GER, KOR). Thus, the diversity of the supplying companies overlaps with the Slovak production and educational culture.

The automotive sub-supplier structure in Slovakia is made up of first, second and third tier suppliers sub-divided into 5 basic groups:

- electrical and electronics systems suppliers (cables, bus systems, embedded systems, semiconductors)
- interior systems suppliers (cockpit, seats, air-conditioning, trim)
- body parts suppliers (body, roof, doors, lighting...)
- chassis systems suppliers (suspension, brakes, axles, steering, tires)
- propulsion systems suppliers (power train, exhaust systems, engines, gearbox, batteries)

Traditional supply chain is systematically changing in Slovakia to a modern supply chain consisting of various types of suppliers and associated organizations:

- 1-Tier system supplier (Johnson Controls International)
- 2-Tier suppliers (Brose, HBPO)
- 3-Tier suppliers (LLEMI)
- Integrated Engineering Services suppliers (EDAG)
- Consultants (IPA Slovakia)
- Small engineering firms, universities and academy of sciences (STU in Bratislava)
- Software service suppliers (SimPlan Optimizations)
- Clusters (Automotive Cluster – West Slovakia)
- Technology suppliers (Robotec)
- Local R&D institutions, centres and organizations (CEIT)

Present day world trends and challenges are determining the new development and creation of both automobile producers' strategies and their sub-suppliers. Specific new technological fields are penetrating into the forefront worldwide that require prompt response. In this respect, Slovakia has several industrial divisions with the potential to adopt and react to current trends, mainly in the following fields:

- automotive industry with focus on green cars development and other relevant industrial sectors (energetics, ICT),
- electrotechnics and electronics industrials sectors,
- information and communication technologies,
- research and development of lightweight materials.

In comparison to the Central and Eastern European region as well as the EU27, Slovakia is among the leaders in the automotive industry when assessing the indicator of the number of passenger cars produced per 1000 inhabitants (in 2009, Slovakia was at the 3rd

rank behind Slovenia and the Czech Republic producing 85 passenger cars per 1000 inhabitants).

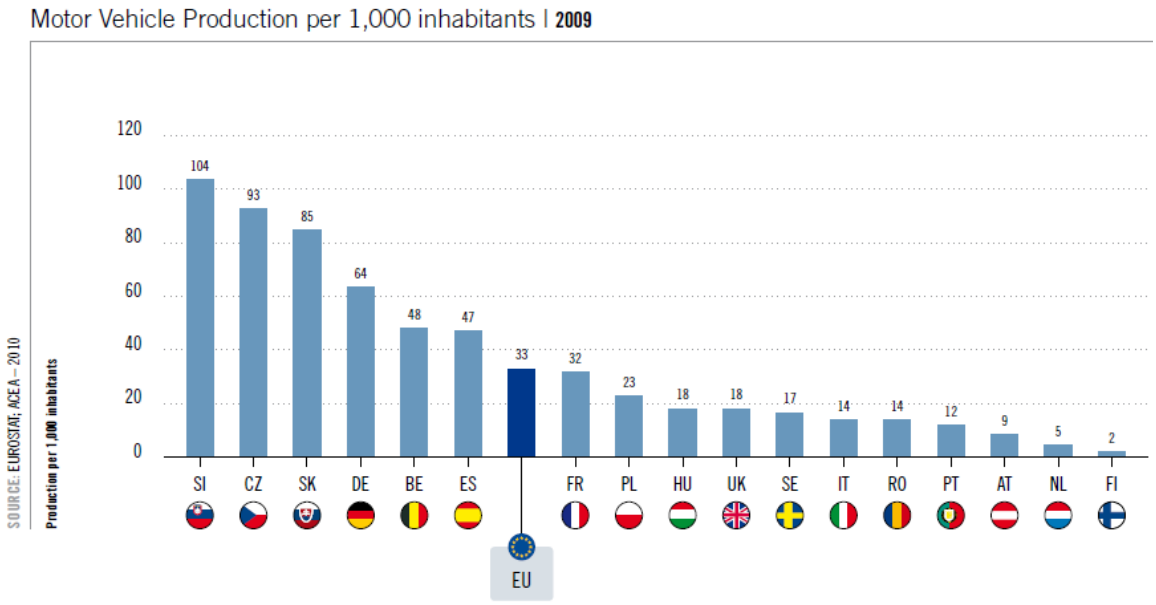


Figure 1

Motor vehicle production in the V4 region (The Visagrad Group: CZ, PL, HU, SK) between 1997-2009, represented an amount of over 20,8 mil vehicles produced in CR: 7 730 036, HUN: 2 135 784, SR: 3 510 859, PL: 7 502 467.

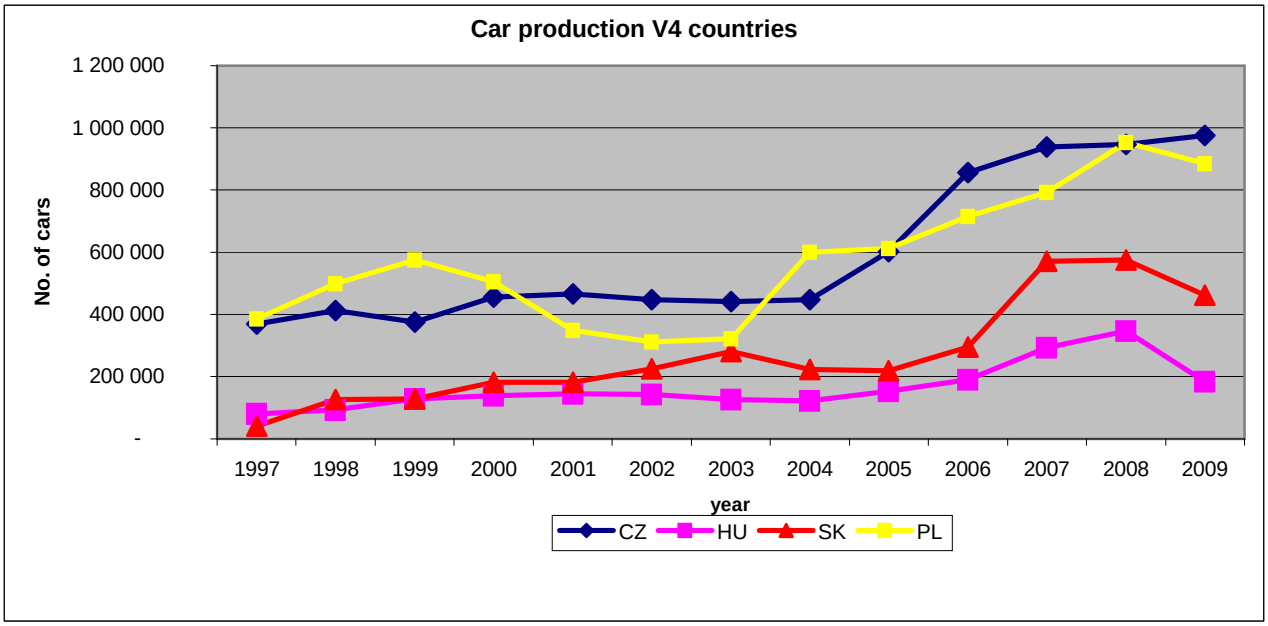


Figure 2

Overall statistics in motor vehicle production in Slovakia:

	2007	2008	2009	% 2009/2008
Slovakia	571 071	575 776	463 140	-19,6%

Volkswagen Slovakia – 105 997
KIA Motors – 150 015
PSA Peugeot Citroen – 207 128

The employment development in the industry is fluctuating at the level of 68.000 employees. In comparison to 2008, a 3,7% drop followed in 2009 in the consequence of the global economic and financial crises. However, from the year 2002 the level of employment within this industry is on the rise labeling the automotive sectors as a key industry in employing workers in Slovakia. The graph below, provided by the Automotive Industry Association of SR indicates the employment development in the sector achieving the highest level in 2007 when 76.000 employees were registered in it.

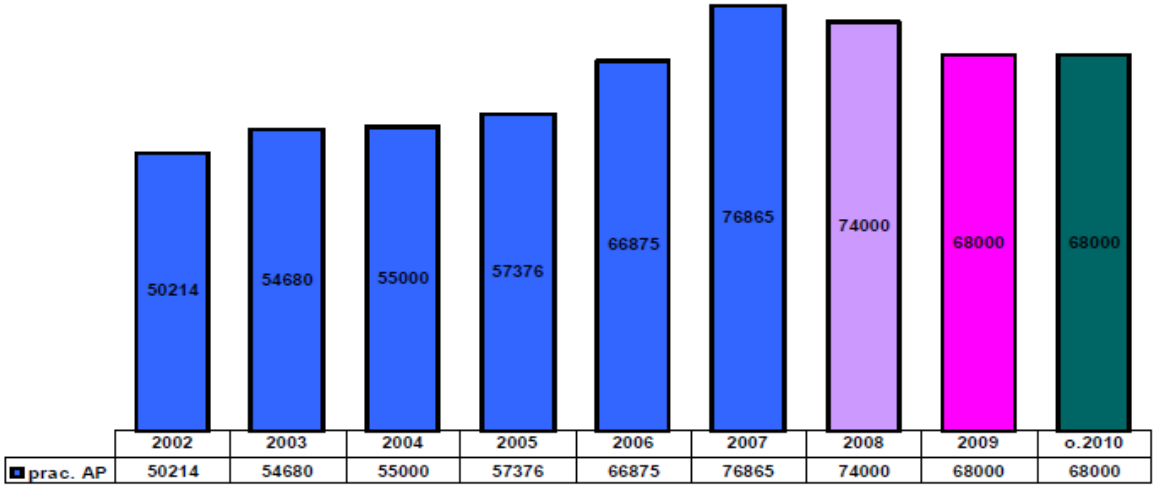
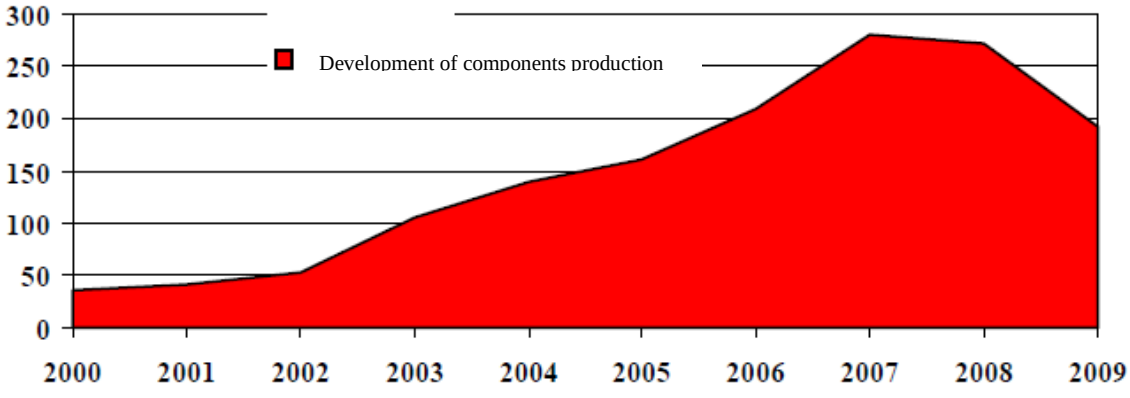


Figure 3

The sub-supplying sector has a significant position within the automotive industry in Slovakia via the presence of global players – main and direct suppliers of the three automotive plants. The most important global companies operating in Slovakia are:

- Mobis Slovakia
- Johnson Controls International
- Faurecia Slovakia
- SAS Automotive
- SE Bordnetze
- GetragFord Transmissions Slovakia
- ZF SACHS Slovakia
- Leoni Autokabel Slowakia
- HBPO Slovakia
- IAC Group (Slovakia)

Another graph by the Automotive Industry Association of SR depicts the component supplies development from the year 2000.



In mld. SKK	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Components supplies	35,87	41,7	53,3	104,8	140,0	160,0	209,7	280,2	271,4	192,4

III. Research and Innovation

None of the three automobile producers has a direct research and development (R&D) representation in Slovakia, whereas R&D and innovation capacities are present within the sub-supplying networks producing for both the Slovak car producers and for abroad.

One example of the present global supplier companies with their own engineering-technological center in Slovakia is the company Johnson Control International in the town of Trencin. Johnson Control International focuses on production and development of car interiors, especially seating systems, dashboards and other. In Slovakia, the company has established 6 montage units and one Business Center in Bratislava.

Besides the sub-supplier networks, R&D in Slovakia is represented by university laboratories, centers and research laboratories of the Slovak Academy of Science. A broad scale of institutions comprises the structure of the Slovak R&D and innovation environment as the figure below visualizes.

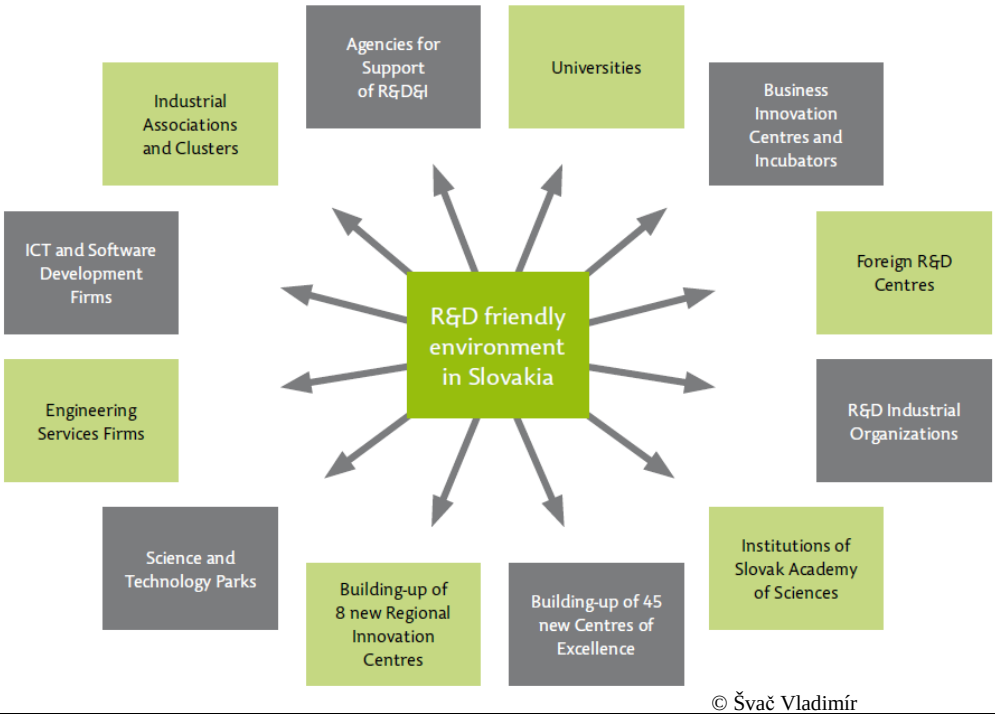


Figure 5

The project AUTOCLUSTERS has been involved in the identification and surveying the innovation capacities of the automotive industry resulting in the creation of an automotive R&D database consisting of **212 automotive R&D capacities** in the project partner countries/regions of Southeastern Europe. AUTOCLUSTERS was a project carried our within the European program South-East Europe with the project leader being the Automotive Cluster – West Slovakia. In Slovakia, the project has identified 36 Slovak innovation capacities within the automotive industry regarded as a positive transformation aspect and as an indicator for a promising development phase for the industry.

Recent trends register an interest of foreign investors for not only production-assembly capacities but also for capacities specializing in research, development and innovation activities within the sector. However, more intensive development of these capacities require the state support primarily for completing highly competitive innovation capacities and preparing human resources (talent development).

One of the analytical outcomes of the project AUTOCLUSTERS is the current orientation of the 212 R&D capacities on the following fields:

1. Manufacturing technologies, mechanical engineering and electrotechnics – 40%
2. Material research and chemistry – 15,6%
3. Product development, vehicle development and prototyping – 14,6%

Lack of the automotive R&D capacities in the field of:

1. Environmental technologies, engines and power-train components (eco-vehicles) – 3,3%
2. Testing and analysis of new technologies – 7,1%
3. ICT, intelligent components, safety and interior components – 8,5%
4. Chassis and vehicle body parts – 8,5%

Despite some positive trends, Slovakia belongs to a group of countries with lack of science-research centers, innovation centers with focus on green technologies, ICT for the automotive industry. This shortcoming could be considered as a key challenge for future development of the automotive industry in Slovakia.

As a next group of development centers, which we recommend to set up and raise attention to are centers for enhancement and development of effective production processes and systems, cost cutting models, shortening the innovation cycles.

IV. Main development trends in the automotive industry in Slovakia

The current development trend in the automotive industry is characterized by a strong representation of foreign automotive sub-supplying companies, which have implemented in Slovakia their own operating culture and production system. Foreign direct investments are positive factors for the economic development on both the national level and regional level including municipality and town development. Consequently, where the foreign companies are located an encouraging impact is registered in the field of education, resulting in new program, curriculum creation focusing on the real demands of the industrial companies. Another contributive phenomenon is the developing cooperation in the field of

R&D and involvement in international projects. These trends could be summarized as follows:

- Employment growth
- Modern industrial production (latest technologies)
- Specific production systems (Production System PSA, KIA WAY, VW Production System, further production systems of the supplying companies from the USA, Germany, Austria, Japan, etc.)
- Regional development
- Educational development
- Development of R&D
- Impact on local supplier companies
- Development of project networking
- Establishment of cluster and networking initiatives

The automotive industry in Slovakia is affected by the global financial and economic crisis and will have to undergo certain advancement changes due to the influential presence of the global companies compelled to adapt to new trends and requirement in the world.

Notable emphasize within the sector is placed on cost cutting, shortening the innovation cycles and more effective production processes, development of human resources, etc. In addition, the sector is becoming part of the so-called multi-sectoral industry, where dividing lines between individual sectors are vanishing. New demands and worldwide development of the industry contributes to creating narrow cooperation and conjunction of sectors, such as the automotive industry with the energetic industry, chemical sector or the electro technical, security technologies, information-communication technologies for the automotive industry and etcetera.

Main challenges for the Slovak automotive industry are:

- Support and development of supplying base for local companies with capacities to develop own research-development capacities
- Support for education and developments of talents
- Implementation of lean principles into all business processes
- Development of innovation management in companies
- Cost cutting
- Improved knowledge and orientation on the customer
- Support for environmental technology and process implementations
- Support for project networking (7. FP and other EU program)
- Close cooperation with neighboring countries
- Development of new supporting services and policies for innovation
- Update of the National Innovation System
- Strategy development for attracting FDI into R&D

THE CONSTRUCTION OF THE AUTOMOTIVE NETWORK: CLUSTER INITIATIVES IN SLOVAKIA

In the past five years, in Slovakia there are in greater degree cluster creation and networking initiatives. The current involvement of clusters in Slovakia creates conditions for establishing business base in the form of cooperation and common projects. Companies have

the opportunity to participate in offered educational course, implemented thanks to various projects. According to the Slovak innovation and energy agency, clusters in Slovakia are divided into two groups: Technological clusters and Clusters of Tourism. Technological clusters are the following:

- 1. Machinery Cluster, Banska Bystrica self-government region
- Automotive Cluster – West Slovakia, Trnava self-government region
- BITERAP cluster, Košice self-government region
- Electrotechnical cluster – West Slovakia, Trnava self-government region (Electrotechnics)
- Energy cluster – West Slovakia, Trnava self-government region (Energetics)
- Cluster AT+R, Prešov self-government region (robotics)
- Košice IT Valley z.p.o, Košice self-government region (Information Technologies)
- Slovak plastics cluster, Trnava self-government region (Plastics)
- Z@ict, Žilina self-government region (Information Technologies)

In Slovakia, the pioneer in cluster initiative development is the Automotive Cluster – West Slovakia located in the town of Trnava, which is already involved in the process of creating cluster networks around Europe. This known Slovak cluster is the leader of the AUTOCLUSTERS project, which main aim is to develop a first Automotive innovation network in the countries of Southeast Europe. Elevated cooperation with international institutions is a presumption for future successful development of the automotive sector based on intensive international cooperation with entities from both well developed Western countries and catching up states such as Slovakia.

Within the AUTOCLUSTERS project the task is to set up a common automotive network, so-called clusters networking. The following clusters are participants of the project: Automotive Cluster Serbia, Automotive Cluster Slovenia, Automotive Cluster Croatia, Technical University of Gabrovo (BG), Technical University of Iasi (RO), Comunimprese (IT), CREATE-NET (IT), Slovak Technical University in Bratislave (STU), West Pannon Regional Development Company (HU) and as a observer of the project is the Automotive Cluster Vienna region (AT).

REQUIREMENTS AND PRIORITIES OF THE AUTOMOTIVE INDUSTRY IN SLOVAKIA

Based on the current trend of the automotive industry in Slovakia, on historical preferences, monitoring worldwide developments and demands on particular continents, transformation of global automotive companies, growing influence of ecological aspects, project activities and further factors of observance, it is possible to compile a list of fields of requirements for the automotive industry in Slovakia:

1. **Energy and Environment**
2. **Material Research**
3. **Science & Education & Cooperation**
4. **Process Improvement and Innovation**

These main groups of requirements can be explained as follows:

1. Energy and Environment

Main aim of this group of requirements is the development of e-mobility in Slovakia interconnected with establishing complex infrastructure for ecological vehicles. Another goal is to support the implementation and utilization of renewable energy resources and creating more ecological production units. This field demands investments into building up physical infrastructure, but also investments into educational and R&D infrastructure.

2. Material Research

Slovakia has at its disposal comparatively good scale of research centers and institutions with focus on material research. In this field, specific research institutes have achieved excellent results and cooperation with internationally recognized research-development teams. Key actors and contractors of material research in Slovakia are at the technical universities and within the Slovak Academy of Science. Material research should be oriented primarily on the automotive industry and new material and technology development for implementing ecological automobiles. This research requires narrow cooperation with partner organizations abroad.

3. Science & Education & Cooperation

An important factor, in the overall progress of Slovakia is establishing effective and firm systems of Science and Education, eventually catching up to the quality of recognized universities and research institutions abroad. Unquestionably, a supporting element for this aim is cooperation with foreign partner universities and various scientific bodies. The modern educational system, scientific background together with industrial demand and support from the state establish and enhance a strong triangle for the development of this group of requirements.

4. Process Improvement and Innovation

Enhancement of production and assembly processes is one of the basic challenge the Slovak automotive industry faces. Implementation of lean principles and innovation activities within companies will become a key model for sustaining competitiveness in the coming years. Least but not last, this aim is achieved by the development of human resources by constant improvement of skills and their strong motivation. All these needs are highly demanded challenges for Slovakia.

Interlinking of the four main groups of requirements for the automotive industry in Slovakia creates two key pillars focusing on:

- Technology
- Development of human resource

These four main groups of identified requirements call for the elaboration of supporting techniques, measurements, policies for supporting innovation and strong

involvement of relevant organizations in project initiatives for the development of the automotive industry in Slovakia.

Notes on the Automotive industry in Italy – Lombardy Region

By Comunimprese

COMUNIMPRESE

CONTENTS

Quantitative - qualitative analysis of Production System

I. Introduction to Production System and its main features

Despite Lombardy region has suffered in recent decades the loss of large car manufacturing plants, the *automotive* industry (including in this area not only cars, but also diversified vehicles and motorcycles) has kept a relevant dimension both nationally and internationally.

Although we can not deny that the lack of major car manufacturers would be (in well under certain conditions) a critical factor, is still present in Lombardy a significant industrial base consisting of components companies (many of which are multinationals) diversified vehicles and motorcycles companies with their supply chains.

Are more than 100 the medium-large-sized Lombard companies operating in different *automotive* sectors, having as reference markets Italy, Europe, South America and the Far East. To these are added the many small and micro-enterprises that are sub-contracted by the medium-large-sized above mentioned, both for components, molds and equipment.

The size of the *automotive* industry in Lombardy is enhanced by the proximity of the most important Italian *automotive* region, Piedmont, and consequently with the Fiat group and the

equally important region with an engineering tradition, Emilia Romagna. The strong commitment to internationalization that characterizes the companies in Lombardy, has allowed the creation and consolidation of technical and commercial relations with other regions of Europe, particularly Germany, Spain and France.

From a SWOT analysis carried out under the project Belcar (Cestec - Center for technology development, energy and competitiveness – Lombardy Region) it is shown that:

- The *automotive* industry is certainly ripe but still remains one of the most innovative and dynamic industries; a large part of process and product innovations in the industry comes from automotive.
- The *automotive* industry is one of the key factors of sustainable mobility.

Critical Factors

- Lack of car manufacturers.
- Presence of many multinational companies willing to relocate where more convenient.
- Presence of many SMEs closely linked to the fate of previous multinationals.
- High labor, land and taxes costs.

Opportunities

- Favourable geographical position of Lombardy; proximity to clusters of Piedmont and Emilia-Romagna in Italy, and easy connections with major European *automotive* regions (Germany in particular).
- Strong and diversified industrial base with the possibility of horizontal transfers of knowledge between different sectors.
- Presence of strong capitals.
- The presence of a network of universities and research centers of excellence.
- The availability of qualified human resources.

II. Products and services produced

The *automotive* industry is particularly developed in Lombardy in the design, construction and sale of vehicle parts. There are really important realities, not only in passenger cars and industrial vehicles but also in motorcycles and diversified vehicles (industrial vehicles, agricultural vehicles and caravans).

With regard to components, there are producers for almost all types, many of them are in Lombardy, but there are also production and research units of multinational companies. It can be noted: wheels, tires, brake systems, pumps, engine components, fuel injection systems, lighting systems, aircraft instrumentation, exhaust systems, car alarms and immobilizer, bodywork and interior, basic electronic components and not, various plastic components, steel, rubber and light alloys, composite materials.

Among services very highly developed is the equipment, prototyping, information technology and organizational consulting field, with particular reference to quality and

safety. There are also primary testing laboratories and research university bodies in support of the activities described above.

The *automotive* Production System must be understood in the broadest sense and not just referring to the *automotive* sector and to the industrial production, so we can mention:

- producers of *automotive* components for cars, motorcycles, industrial vehicles and various vehicles.
- Manufacturers (OEM) of motorcycles, agricultural vehicles, industrial vehicles and caravans.
- Producers of machinery, plant and equipment (molds, assembly equipment, industrial automation systems).
- Service Providers: Design, CAD / CAM, prototyping, simulation, information technology and organizational consulting.
- Testing laboratories for mechanical, electrical, crash testing, *failure analysis*, acoustic tests and electromagnetic compatibility.

The most important technological fields may include: mechanics, precision mechanics, electronics, mechatronics, new materials development, processing materials technologies (eg rubber and plastics molding, machining with deformation of ferrous alloys and light metals), ICT and telecommunications, lighting, sensors and computer vision. The *automotive* industry also involves many other components-related areas, including but not limited we can mention: the design industry, the textile industry, information technology. Major settlements in numerical terms, refer to the provinces of Brescia, Milan, Bergamo, Mantova and Lecco.

The *automotive* chain in Brescia, in particular, is by itself the second largest Italian *automotive* center after Torino (Piedmont) with about 300 units with 20,500 local employees, with an average size of local units in the chain of 60 people against 11 employees of the manufacturing industry in Lombardy.

The European Observatory on Cluster (www.clusterobservatory.eu) places the *automotive* cluster in Lombardy seventh in Europe in terms of employment, with over 50,000 employees.

The data ANFIA (National Association of Automotive Industry Chain), partner of *automotive* production system, rated in 2008 the *automotive* industry across the Lombardy region in a total of 711 companies, broken down as products of interest:

Suppliers of processes, technologies, systems	300
Modules suppliers	32
Components suppliers	379

The figure brings the average size of companies to over 70 employees, configuring the *automotive* sector with a size seven times bigger than the reference sector (engineering).

If we consider that the Italian components chain includes about 2,500 companies in the sector, for a total of 375,000 employees (direct and indirect) and a turnover of over 95 billion euro (Italian Centre of Automotive Components 2009), the reality in Lombardy represents almost 15% of national production system, second only to Piedmont.

Total turnover for Lombard *automotive* sector is estimated at a figure between 15 and 20 billion euros, representing 15% of the total turnover of Italian *automotive* industry.

Regarding R&D, compared to EUR 20 billion invested annually by the industry at European level, between 2 and 3 billion come from Italian *automotive*, representing the national leading production system, at a cost that covers about 25% of Italian private spending on R&D.

III. Markets (characteristics, turnover, geographical distribution, etc …)

Recent surveys of markets in the *automotive* sector (source ANFIA) speak of a progressive liberation of Lombardy area from the traditional Italian export market (mainly the Fiat group); 72% of the 711 companies surveyed works for non-Italian companies, with a percentage breakdown very balanced on the various geographical areas.

Exports of national automotive industry is in 2008 about 8,1% of total national exports, in line with what recorded in 2007. Exports of Brescia area alone amount to almost 2 billion euros and represent 14% of total exports of the Province of Brescia. The positive balance of foreign trade sector is more than 1 billion euros, which is 25% of the positive import-export of Brescia.

IV. Research and Innovation

The automotive Production System, despite its importance, is not considered a mature industry: most industrial innovations on the market are still generated by the sector's needs. Suffice it to say that in recent years there has been a strong impetus to the search for new solutions to meet the need for greater security and reducing environmental impact. Significant can be transfers of technology from other fields (e.g. aerospace) as well as important is the research on new materials that combine strength, aesthetics, lightness.

The *automotive* sector, for its characteristic of high-tech sector, but with very high volumes and low costs, is a link between high-cost and low volume technologies and their introduction into to mass markets. Traditionally, the introduction of technologies that typically come from sectors such as defence, space, aeronautics find in *automotive* their high reliable and low cost applications, thus becoming widely available. The role of the *automotive* business so it is strategic in defining the competitive position of a country from the technological point of view; moreover in this area the collaboration between numerous different sized companies is required by the complexity of the final product and promotes a truly widespread dissemination of innovation.

V. Mapping technological-productive system (integration)

In the system there are the chain of component suppliers (1st, 2nd and 3rd TIERS) vehicles and several motorcycles OEM. Relating to component suppliers, which represent the lion's share, the main glue for their integration is the industrial policy of their clients.

The latter are increasingly requiring their suppliers no longer the single component but 'complete systems' composed by the union of several components. In addition, the other request is the 'full service' demand from the product development (design in co-design) to its realization, production and delivery (integrated logistics). All this will make in the future to an ever closer cooperation between the suppliers of the chain.

This implies the involvement and close cooperation with companies making up the supply chain already in the process of product design (codesign - simultaneus engineering) and then continue during the development of design, prototyping and testing of quality.

In this context, the production companies are bound to compete on the grounds of flexibility, technological content and level of innovation in products and processes.
The logistics processes are often common among the suppliers of the same OEM. The presence of the supply chain driven by first-tier suppliers drag into that integration also the smaller suppliers. It is a custom in the *automotive* world the *just in time* delivery order due to minimizing the stores: this involves scheduling of weekly transmission deliveries to suppliers via the Internet, widespread use of MRP II systems, optimization of transport and packing.

VI. Mapping of the excellence of the Production System

Almost all large companies in the sector in Lombardy and several SMEs are engines of innovation. There are some recognized worldwide for their excellence, though:

- SAME DEUTZ-FAHR (SDF) - Treviglio (Bergamo) under the brands: SAME, Lamborghini, DEUTZ-FAHR and Hürlimann
- BREMBO - Curno (Bergamo): a leading manufacturer of braking systems currently operating in 3 continents with production sites in 9 countries
- PIRELLI TYRE – Milan: it is the fifth largest firm in the world in terms of turnover on the tire market, with levels of profitability among the highest in the industry
- IVECO - Brescia for the production of Eurocargo, mid-range and medium-high truck, leader in Europe; Suzzara for the production of DAILY, light truck and medium-light, also a leader in Europe and popular around the world
- Magneti Marelli (Corbetta, Milan)
- STMicroelectronics (Agrate, Milan)

From a territorial point of view is to be recorded the excellence in Brescia where there are important multinational groups of *automotive* components: TRW, GKN, Stanadyne, Hayes Lemmerz, Federal Mogul, SK Wellman, Modine, Timken.

The employees in the sector account for 12% of the total employment in manufacturing in Brescia.

Establishments of foreign multinationals are 12, with 2,300 employees (11% of total employment in the chain). The enterprises in Brescia producing abroad are 14, with 40 plants and 5,000 employees.

Major component suppliers include:

- Mechanical Workshops Rezzatesi of Rezzato - assemblies and components, engine and chassis

- Streparava of Adro - suspensions, axles, engine components and chassis
- CF Gomma Passirano - rubber compounds, suspension motor and transmission
- Cromodora Ghedi - light alloy wheels.

VII. Main development trends in the Production System (short term)

Despite the current economic situation (2009) affects in particular the automotive sector, it is conceivable that the *automotive* industry will be growing on a global scale; circulation of people and goods is rising steadily with the rhythm of a few percent per year in Italy and is expected by 2020, the doubling of the world circulation. The industry is going through a process of transformation that is linked to three main factors:

- reorganization aimed at reducing costs and hence the size of the OEM and their supply network.
- A globalization process that is going to integrate markets so far separated of the first and third world and involving both the OEM and suppliers to several levels of responsibility.
- Technological change induced by a drive for greater environmental sustainability of the mobility system as a whole (particularly in urban areas), of the product car vehicle and related processes and, on the other hand, the introduction of cross-cutting technologies with a strong impact on product (telematics, information technology, bio-materials, storage systems and energy ...).

If Lombardy will become competitive, growth prospects will be even better than projected: the integration of the production chain that has never even been assumed in Lombardy (and which should be created with the project POLI-AUTO) could be a factor for the progress of the local *automotive* industry.

Looking ahead, one perceives a serious risk of loss of tens of thousands of jobs in the productive system. Beyond the major social impact that this situation can generate, there is a real risk of losing the integrity of the entire chain of Italian components and hence of its product and process know-how and of its strong ability to innovate.

VIII. Main development trends in the production system (medium-long term)

As for the future of the Production System POLI AUTO, you can identify a strong element of weakness, the lack of a regional real *automotive* cluster that can be a focus and driving force of the production system. The European Observatory on Cluster (www.clusterobservatory.eu) in the table below highlights the important Lombard *automotive* production system and places it back to seventh place in Europe with over 50,000 employees (this figure corresponds to the figure ANFIA of 711 companies with about 70 employees per company).

Evaluation of automotive cluster strength: **3-stars**	
Regional Cluster	***Employment***
Stuttgart, DE	136 353
Piemonte (Turin), IT	85 915
Oberbayern (München), DE	82 339
Braunschweig, DE	79 997
Dogu Marmara (Bursa), TR	44 901
Västverige (Gothenburg), SE	42 832
Karlsruhe, DE	40 694
Niederbayern (Landshut), DE	37 960
West Midlands (Birmingham), UK	37 913
Sud – Muntenia (Ploiesti), RO	32 935
Severovychod (Hradec Králové), CZ	31 578
Stredni Cechy (Prague Surr), CZ	29 511
Castilla y León (Valladolid), ES	27 136

Evaluation of automotive cluster strength: **Employment**	
Regional Cluster	***Employment***
Stuttgart, DE	136 353
Piemonte (Turin), IT	85 915
Oberbayern (München), DE	82 339
Braunschweig, DE	79 997
Cataluña (Barcelona), ES	74 086
Île de France (Paris), FR	61 351
Lombardia (Milan), IT	51 631
Vlaams Gewest (Antwerp), BE	46 084
Dogu Marmara (Bursa), TR	44 901
Västverige (Gothenburg), SE	42 832
Karlsruhe, DE	40 694
Niederbayern (Landshut), DE	37 960
West Midlands (Birmingham), UK	37 913

It can be seen that, given the importance of the production system, such *automotive* production system in Lombardy is not represented. Similar production systems belonging to Turkey, Romania and Czech Republic are represented!

The production system POLI AUTO has the following objectives:

1. identity and global visibility
2. collaboration between large companies, SMEs, research centers and universities
3. direct interaction with public administration to address funding opportunities
4. participation in European research projects (7th Framework Programme)
5. qualify the local supply network
6. safety net for SMEs

Initially, the Politecnico di Milano - Department of Mechanics, Kilometro Rosso CSMT have signed a letter of intent that promotes the support of the technical-technological activities of the Production Systems.

The construction of the network: Production System POLI-AUTO

I. Activities implemented under the project to involve enterprises in POLI AUTO network

a) Constitution of a Committee representative of Lombard automotive production system

In spring 2009 two promoting committees have been set up (POLI-AUTO and AUTOMOTIVE INDUSTRY CHAIN) to participate in the Lombardy Region Driade / Daphne Programme, both referring to the *automotive* reality in Lombardy.

To the scope of representing in a coordinated fashion the whole *automotive* situation in Lombardy, the leader of the project proposal POLI-AUTO, "Politecnico di Milano - Department of Mechanics" and the leader of AUTOMOTIVE INDUSTRY CHAIN, CSMT

Gestione Scarl, have agreed to unite in a single production system (called POLI-AUTO) to promote and develop the creation of a single *automotive* production system.

b) Creation of the Selected Committee

It was set up a Selected Committee, composed of Politecnico di Milano, Kilometro Rosso Science Park, ComuniImprese Scarl and CSMT, with the main objective of furthering networking actions for the formalization of the new *automotive* production system.

c) Networking actions – large companies and associations

Following the formalization of the unique system called "Production System POLI-AUTO", large companies and associations participating in the organizing committee have been asked to identify other innovative companies in the automotive sector as potential partners in developing R&D projects within the production system.

d) Networking actions – Selected Committee

Actions aimed at promoting and expanding the production system have been carried out. Each member of the Selected Committee, through its network of industrial relations, has pledged to support actions for the enhancement and promotion of the production system.

The strategic role of new participants for the development and consolidation of the network, is summarized in the "DECLARATION of INTENTS for the promotion and development of technical-technological Production System POLI-AUTO", which defines the basic agreement for the actual formalization of the New Automotive Lombard Cluster, according to the following agreements entered into by the technology partners of the productive system:

- share scenarios of technological development, identifying joint interests of members in the Production System.
- Encourage the technological strategies of POLI-AUTO through actions of networking with companies, universities, research centers, technical, class and territorial associations, development agencies, government agencies involved (also partly) in the *automotive* sector and other industries who use *automotive* technologies.
- Support promotional activities within companies operating in the *automotive* sector, with the contribution of institutions and research organizations at regional, national and international level.
- serve as technical-technological point of reference for public bodies of Lombardy Region to orient its policies in support of technological innovation in the automotive industry;
- Favour within the production system, collaboration and technological exchange between companies, universities and research centers.
- Promote contacts, exchange of knowledge and participation in technical and technological projects at international, national and EU level partnering with other clusters, with particular reference to those who are currently working with Comunimprese Scarl in European projects in place.
- Encourage the participation in calls for proposals launched by Lombardy Region within the DRIADE Programme to support R &D projects within the seven Lombard "production systems" officially recognized.

Needs and priorities of the Production System

I. Activities implemented to collect and analyze the needs and priorities of the Production System

The aim was to consider the present needs for the development of products to be introduced on the market over the next 2-3 years.

II. The methodology for the formalization of needs:

The term "need" can be applied both to the results (performance) of a firm (costs reduction, customer service improvement, innovation) and necessities (critical factors, resources at disposal: money, human resources , flexibility). To better illustrate the concept it is presented a correlation matrix results/critical factors. These are the main ones and are set by the opinion of industry experts and through literature.

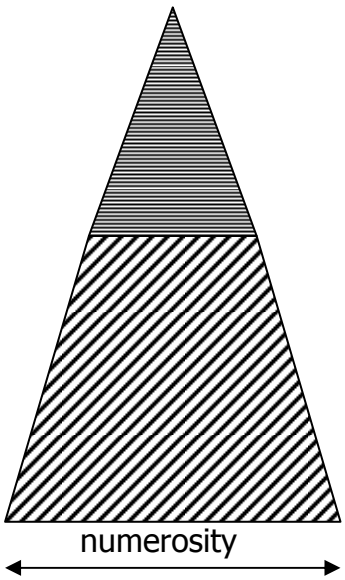
The critical factors were grouped into two broad categories:

A. those country-dependent and industrial policies-dependent (last ones not influenced);

B. those that may be influenced by regional policies and by the newly born cluster;

Returning to the general objective of the analysis (maintenance and development of the chain in Lombardy), it was concluded that the survey on the needs had to be undertaken to establish the priorities attributed by companies to the factors of group B. In addition, for some of them, especially those concerning the trend of R&D, it was necessary to clarify the issues on which to launch innovation projects.

Another consideration that guided the collection of information on needs and the drafting of the questionnaires is related to the characteristics of *automotive* production system, which is configured as a supply chain with a pyramidal development, characterized by relatively few large companies (often multinational) and a growing number of SME suppliers as we descend into the supply chain.



CLIENT (OEM)

1st TIER
Large Companies

2-3-4th TIER
SMEs

GENERAL TOPICS

SYSTEMS
PRODUCTS

PARTS AND
PROCESSING
TECHNOLOGIES

The SMEs in the cluster/production system are still in a relationship of great dependency on

large corporate customers, the latter having a dominant role in their turnover.

Winning new customers in the automotive world is no easy task and requires a lengthy technical and commercial process, long certification procedures, knowledge of languages and the solution of considerable logistical problems for deliveries *just in time*. Companies can (and often is the case) follow their customers abroad, but this can have a ripple effect even more disruptive in the area.

As the supply chain, also the "technological chain" follows the same pyramidal pattern: a few large general topics at the summit explode into more and more as you go down the chain.

III. Areas of assistance

Relating to the above it has been identified the following priorities for the *automotive* Production System in Lombardy, listed in alphabetical order because they are considered equally important:

- Energy and environment.
- Weight reduction (with regard to materials and automotive products).
- Safety.

These priorities can be explained as follows:

A) Energy and Environment

The main objective is to reduce the use of fossil fuel and its environmental impact, and increase sources of renewable energy, safe, environmentally compatible and in sufficient quantity. Innovation should be addressed to:

- The electrification of vehicles and road transport system.
- Mass reduction.
- New vehicle concepts with high energy-efficiency standards.
- Primary energy and alternative fuels and drive systems.

B) Reduction of the weight (with reference to materials and automotive products)

There is a need to seek strategic materials and technologies that enable significant reductions in weight and are compatible with the requirements related to economic and industrial production. The weight reduction should not be seen only through the use of innovative materials such as composites, foams, super alloys, etc.., but also through a more efficient use of traditional materials (ferrous, non-ferrous and synthetic):

- Development of structural materials (metallic or not).
- Developmnet of supporting technologies.

C) Security

The introduction of new types of vehicles based on the materials 'light' and a new design, alternative fuels and new systems of electric traction, requires that the security features of these vehicles are the same as those conventional:

- safe use of new materials and experimentation.
- Study and implementation of security systems, active / passive safety / ICT for future vehicles.

- Study of the safety features offered by new vehicle types, for example braking system, electric or hybrid traction.

Notes on the Automotive industry in Slovenia

By Automotive Cluster Slovenia

CONTENTS

Background

I. Slovene automotive industry

Proof for the Slovenian automotive industry's success is the previous period. Based on their own knowledge and intensive investment in technology development, Slovenian automotive suppliers, grew from a small group of unrelated businesses and institutions in a closely linked network of development partners to the most of the world's top automobile manufacturers.

In Slovenia, the production of passenger cars involves only one company - Revoz, while the production of automotive components involves many companies, mostly they are all suppliers of first and second order. Among the most notable suppliers certainly falls Cimos Prevent, TPV, Iskra Avtoelektrika, Hidria, Kolektor, Unior,...

Although Slovenia is small, its automotive sector is relatively extensive. Allowing us to drop through the supply chain a little bit lower, could be found that there are, in this industry, indirectly involved at least several hundred other companies. Today, Slovenian automotive industry unifies 85 companies, over 600 contractors and knowledge institutions with more than 24,500 employees and 147,000 people indirectly related. Companies create more than 5mlrd €, from which over 80% is exported. This represents 21% of total Slovenian export and 10% of total Slovenian GDP. On average, Slovenian automotive industry invests 5% of turnover in research and development and over 12% in the new technologies.

Integration, both vertically and horizontally, has always been an integral part of our policy development. We believe that active cooperation leads to a winning combination for all

parties and that this is the way for all involved actors to achieve goals faster and easier. Therefore, we actively cooperate also with universities and institutes, we are an active member of CLEPA (European Association of Automotive Suppliers), ERTRAC (technology platform for vehicles, roads and transport) and an important member of the cross-border projects of integration in the automotive sector (STARNET, COIN, AutoNet, Autoclusters, ACE, CP50+, etc). Through advisory committees in the European Commission, we influence the industrial policy in the automotive sector, carry out developmental projects for creation the networks of enterprises and support institutions in South Eastern Europe and Russia. Our openness, penetration and in particular the effective recognition and realization of the right ideas, were recognized also outside of Slovenia. ACS is also a regular guest of all major conferences in the field of networking and mutual linkage of suppliers.

Slovene's automotive industry is highly-technologically developed and operates according to a number of modern organisational principles such as lean production, benchmarking and multifunctional production.

II. A modern industry with roots

Slovenia, with a population of approximately 2 million, is sometimes described as a "mini Switzerland." With GDP per capita of approximately € 17,076, it is one of the wealthiest of the new EU member states.

Slovenia has a mature automotive market. Car density stands at an impressive 615 cars per 1,000 people, which brings it close to that of many Western European countries. Primarily due to its location, Slovenia was the trading hub of the former Yugoslavia, with most manufacturing taking place in Serbia, Croatia and Montenegro. From the point of view of the automobile industry, this makes the country an attractive gateway to the other former Yugoslavian countries. The port of Koper is used extensively, particularly by Asian automotive manufacturers.

Through an agreement with local manufacturer Revoz, Renault has been present in the country since 1972. The company's Novo Mesto plant today produces approximately 200,000 passenger cars per year. Revoz is Slovenia's biggest car producer.

III. The crisis and the state of the industry

Automotive industry counts for one of the biggest victims of past economic and financial crises. Automotive industry in Slovenia is the biggest export industry in Slovenia as there Slovenian companies export most of its production. The decline in demand that had arose from the instability of financial markets and also because of the rising energy prices, has led the Slovenian automotive industry in troubles. Nevertheless there are the first signs of recovery seen, the market is still far from being recovered. Consumer confidence is not falling anymore, however it is still at a very low level. This results in a logical sequence of events:

- ⇨ customers buy smaller and more affordable cars
- ⇨ in average buyers change their minds or postpone buying a car until they have more financial resources
- ⇨ stocks of vehicles at dealerships begin to accumulate

- ⇨ car manufacturers are forced to reduce production and to lower the costs of production
- ⇨ car manufacturers need to lay off workers

Slovenian automotive industry is experiencing all the vigour of competition, in attracting and acquiring new business as well as in meeting the daily needs of customers. Customers are namely increasingly demanding good quality and good delivery terms as well as good price, which of course exist for all segments of customers.

Elements of automotive development strategy

The main competitive advantage of advanced companies is and will be the innovation. This is true both, for large as well as for medium and small enterprises. Companies should offer their customers great added value (uniqueness, diversity), for which they are awarded with the appropriate price. Being innovative is not easy, it requires a lot of knowledge, innovation, teamwork, organizational skills, collaboration, multidisciplinary, an appropriate business environment, happiness and high financial resources.

I. Objectives

A key objective of the new Automotive industrial policy pillar is to provide an appropriate "environment" that will enable companies to invest in research and development in priority areas, identified in the ACS Strategic Development Plan 2009-2014 and the recommendations of the working group for vehicles, transport and logistics in the context of Council for Competitiveness and includes the following areas:

- ⇨ environment and efficient usage of energy
- ⇨ safety
- ⇨ comfort
- ⇨ New materials and technologies to implement the above functions for the user of the vehicle.

It is essential that the industrial environment supports projects related to innovation processes, trainings for suppliers, upgrading the developmental infrastructure, information infrastructure as well as the investment in basic knowledge.

With all the above, the government can help to maintain the position and competitiveness of Slovenian automotive industry and to promote and accelerate research and development, as well as technological innovations, that are in line with the policy of the Republic of Slovenia, and provide further technological breakthrough of Slovenian automotive industry.

II. Indicators

Of course, the appropriate industrial policy shows results not earlier than in the long run and for this reason it is essential to continuously monitor the performance indicators:

- ⇨ number of new products and markets
- ⇨ growth in sales value
- ⇨ value-added growth
- ⇨ number of innovations

- ⇨ number of new suppliers
- ⇨ number of new high skilled jobs
- ⇨ internal rate of return (IRR) and return on assets (ROA)

III. Functioning mode

Effective industrial policy needs to ensure, that the enterprises and the R&D and knowledge institutions will faster adapt to changing market conditions as well as to ensure that these enterprises and institutions will effectively use all the challenges, which are offered and arisen on the market. Special emphasis should be placed to ensure joint research and development, to keep pace and rhythm of development in the most rapidly developing industry in the world, to ensure the emergence of new products and technologies and thereby influence the increased volume of inquiries. The objective is clear; effective, efficient and profitable growth.

Industrial policy will:

- ⇨ provide easier access to funds for investment in developmental projects and enable to maintain the competitiveness in the market;
- ⇨ increasingly invest in research projects that provide long-term competitive advantage;
- ⇨ ensure efficient use of EU funds which are now, because of the criteria and conditions of a narrow focus on vehicle manufacturers, promoters of development, not reaching the other innovative companies;
- ⇨ to provide technical infrastructure and to link of the industry with knowledge institutions, which ACS can provide with its extensive network of companies and knowledge institutions.

IV. Catalyst

Industrial policy will be a catalyst and driving force behind R&D processes in the automotive business pillar, where it comes, in the process of research, to the generation of new ideas. The main process here is to identify key areas and projects where the potential penetration of new products or technologies exists. In the future, there will be a new important technology, function or a product, which will ensure the existence and further development of the automotive industry in Slovenia.

Key Development strategy directions

In accordance with the development strategy of ACS and the Republic of Slovenia, the following key areas have been defined:

- ⇨ **ENVIRONMENT AND ENERGY EFFICIENCY**

Efficient use of energy is becoming in terms of (end) users the key characteristics of vehicles, which has the most explicit impact on the environment, but it is also the biggest cause of energy[1] loss. This will be one of the main areas in which we see the possibility of penetration

[1] In Europe, 11% of greenhouse gas emissions comes from vehicles, while on a global scale the proportion is 5% (Europe is involved in this issue by 1.5%).

and continued growth. All the most developed economies: the United States, European Union, Canada, Japan, Australia and New Zealand, imposed to this area new and more rigorous directives, but at the same time also a financial support for the purchase of environmentally friendly vehicles. Consequently, this requirement will affect the suppliers.

The objectives within this area are to develop, validate and manufacture components for propulsion systems that will comply with EURO 5 (6 ...) and thus contribute to reducing of emissions of CO2, NOx and particulate matter, optimization of energy efficiency, the expansion of renewable energy and strengthening the position of the first suppliers tier (Tier-1) in the world automotive industry. R&D projects in this area will upgrade the existing competencies in functions where enterprises and institutions are specialized in, but also tolerate the possibility of a penetration to the other areas.

- ⇨ **SAFETY**

Safety is one of the core values of modern society and it is as such also very important in the automotive industry as well. The question of security is in fact no longer an issue, but an obligation in all new generation vehicles. On this basis we will support R&D projects in the field of automotive safety, especially those with a clearly stated objective to develop new »principal« solutions, suitable for further development of technology (knowledge transfer in technology).

The objectives will not be targeted only to improving the safety of vehicle occupants, but also to ensure greater safety of other traffic participants, pedestrians and cyclists. Special attention will be devoted to new active and passive safety system that will ensure better protection of the most vulnerable traffic participants.

- ⇨ **COMFORT**

Comfort is the key characteristic that separates car manufacturers from each other and most importantly, the share of suppliers in this segment is more and more important. While some experts predict that in a period of crisis, comfort will not play a key role, it is clear that at the end of the crisis, comfort at an affordable price is crucial.

This includes various electronic vehicle accessories (power steering equipment, automatic ventilation ...), as well as chassis components, elements in the passenger compartment and interior equipment (seats, covers,...). In this area, works many Slovenian companies which are also willing to invest resources in further development of new products and other related new technologies.

- ⇨ **NEW MATERIALS AND TECHNOLOGIES FOR THE IMPLEMENTATION OF THE ABOVE FUNCTIONS FOR USER VEHICLE**

Effective and successful growth of companies is based on developing and selling new, innovative products. One can not forget the competences which are essential for effective development and further production of these products. Special attention and support will be draw to the development of new materials and technologies that will provide faster and

more profitable development of new products. It is crucial to support those projects which will be closely involved in the development of new products.

The main principle of the projects will be their environmental orientation. An important role will play the development of new, lighter materials that can directly reduce greenhouse gas emissions. Special attention will also be paid to eco-oriented development and production as well as to reducing emissions, already in the phase of the development and manufacturing of the products. Already in the phase of product development, the requirements for the decommissioning of the product at the end of the life cycle and the possibility of recycling and reusing materials should be taken care for.

In addition to the above orientations, we will pay a special attention to projects that have as its objections:

- ⇨ building of appropriate infrastructure that will create the conditions for long-term work flow and development of creative professionals;
- ⇨ provide the conditions for the global performance of companies in the field of new products and technologies and the increasing competitiveness on the basis of specialization and ability to innovate;
- ⇨ provide the conditions for the growth of knowledge-based institutions in the region;
- ⇨ quality development of supplier chains (optimization of production processes, training, development of suppliers in the SME)
- ⇨ creation of new knowledge, skills and competences in the field of ecology, mobility, security and comfort;
- ⇨ Establish a cooperative network that will base on strong developmental partners, education and international cooperation.

Notes on the Automotive industry in Hungary

By Mid-Pannon Regional Development Company

CONTENTS

I. INTRODUCTION AND THE MAIN FEATURES OF THE AUTOMOTIVE INDUSTRY IN HUNGARY

.In the last half century, severe commercial vehicle manufacturing capacity has been built on strong historical foundations in Hungary: the post-war experience of important manufacturers like Ikarus, Csepel Autó and Rába. This longstanding expertise and the already existent competence were of good use at the first investments. The new passenger vehicle manufacturers were established on the basis of the already existing capabilities. The country's excellent logistics situation, the high level of the educational system and the vast radition of automotive development and production encouraged investments. Structural reform at the turn of the millennium brought production methods requiring great expertise and creative employees and, with them, higher value-added production. Owing to the quick introduction of modern corporate management and quality assurance systems, productivity in Hungary reaches the Western European average.

The motor-vehicle industry has a rich heritage – the motoring world can thank Hungary for countless significant developers and their discoveries and inventions The following are a few of the considerable Hungarian inventors and innovators in automotive history and their claims to fame:

- ✓ János Csonka – invented carburettor (1890);
- ✓ József Galamb – organised mass production of Ford Model-T (1905–1915);
- ✓ Béla Barényi – conceived idea of active vehicle safety and active safety codes (1939–1972);
- ✓ Ferenc Pavlics – creator of moon craft and Mars vehicles (1961–1988);
- ✓ Gyula Cser – invented the combined engine-charging system (1968);
- ✓ Ferenc Anisits – managed BMW Diesel engine development (1981–1999).

There are four trans-European motorways running through Hungary that is more than in any of the neighbouring countries. Hungary has a particularly strong competitive advantage when the Balkans and Middle East are concerned, since most of the countries in this region can only be reached through Hungary. The Helsinki-corridors intersect in Budapest, in the

vicinity of which other thriving logistics centres have already been established. Hungarian transport policy has earmarked grant-in-aid and development assistance to the newer logistics centres (e.g. Székesfehérvár, Debrecen, Szeged, Miskolc, Szolnok, Nagykanizsa and Tiszaújváros).

The passenger car industry in Central European (CE) countries including Hungary has grown rapidly since the mid-1990s. As a result, the share of the automotive industry in overall employment, production and value added has significantly increased and, with the exception of Slovenia, the automotive industry has become one of the key manufacturing branches for all CE economies.

Hungary is a favoured destination of foreign investors of automotive industry resulting in the presence of General Motors (Szentgotthárd), Magyar Suzuki (Esztergom) and the largest Audi factory (Győr) in Central Europe.

17% of the total Hungarian exports comes from the exports of Audi, Opel and Suzuki. The sector employs about 90 000 people in more than 350 car component manufacturing companies.

Audi has built the largest engine manufacturing plant of Europe (third largest in the world) in Győr becoming Hungary's largest exporter with total investments reaching over € 3 300 million until 2007. Audi's workforce assembles the Audi TT, the Audi TT Roadster and the A3 Cabriolet in Hungary. The plant delivers engines to carmakers Volkswagen, Skoda, Seat and also to Lamborghini. Audi will invest around EUR 900 million by the end of 2013 to expand the automotive production plant in Győr and the car manufacturer will create 1 800 new jobs.

Daimler-Benz invests € 800 million ($1.2 billion) and creates up to 2,500 jobs at a new assembly plant in Kecskemét, Hungary with capacity for producing 100,000 Mercedes-Benz compact cars a year.

Opel produced 80 000 Astra and 4,000 Vectra cars from March 1992 until 1998 in Szentgotthárd, Hungary. Today, the plant produces about half million engines and cylinder heads a year. Opel is expanding its operation in Szentgotthárd. With an investment of EUR 500 million, the site, built in 1990, will be expanded and prepared for the construction of three new engine families characterized by low fuel consumption and reduced CO2 emissions. The new plant will offer 800 jobs.

HankookTyre will invest € 230 million to expand its car-tyreplant in Rácalmás.

Figure 1: Motor Vehicle Production 1998-2008

PRODUCTION		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CAR	Audi	13 682	53 776	56 770	55 296	53 606	33 892	23 589	12 307	23 670	56 982	60 359
	Opel	9 746	4 008	0	0	0	0	0	0	0	0	0
	Suzuki	66 305	68 105	77 253	85 105	84 633	88 446	95 001	136 226	164 003	231 000	282 000
	SUM	***89 733***	***125 889***	***134 023***	***140 401***	***138 239***	***122 338***	***118 590***	***148 533***	***187 673***	***287 982***	***342 359***
COMM.VEHICLE	Rába	252	97	38	5	0	60	139	158	3	81	47
	Schwartzmüller	1 260	1 200	1 430	1 350	1 570	1 780	2 450	2 315	no data	3 485	3 020
	Others	49	10	153	753	587	815	586	no data	no data	no data	no data
	SUM	***1 561***	***1 307***	***1 621***	***2 108***	***2 157***	***2 655***	***3 175***	***2 473***	***3***	***3 566***	***3 067***
BUS&COACH	Ikarus	1 180	414	952	801	274	216	50	0	no data	no data	no data
	NABI	456	510	660	866	736	782	707	851	no data	294	299
	Rába	0	66	97	65	57	33	54	18	no data	no data	no data
	Kravtex	0	0	0	0	0	0	0	90	no data	no data	130
	Others	0	0	39	72	50	92	90	50	no data	185	200
	SUM	***1 636***	***990***	***1 748***	***1 804***	***1 117***	***1 123***	***901***	***1 009***	no data	***479***	***629***
Total Sum:		**92 930**	**128 186**	**137 392**	**144 313**	**141 513**	**126 116**	**122 666**	**152 015**	**187 676**	**292 027**	**346 055**

Source:AHAI (Association of the Hungarian Automotive Industry)

These figures show the vehicle production characteristics of the main Hungarian manufactures divide to three branches (cars, commercial vehicles and buses). Suzuki and Audi are the top car manufactures, Opel finished this activity in 1999, since then this GM subsidiary had built up a significant engine-production capacity. Note that along with the massive downfall of Ikarus Corp. there were some new small scale actors emerged in the bus/coach manufacturing sector.

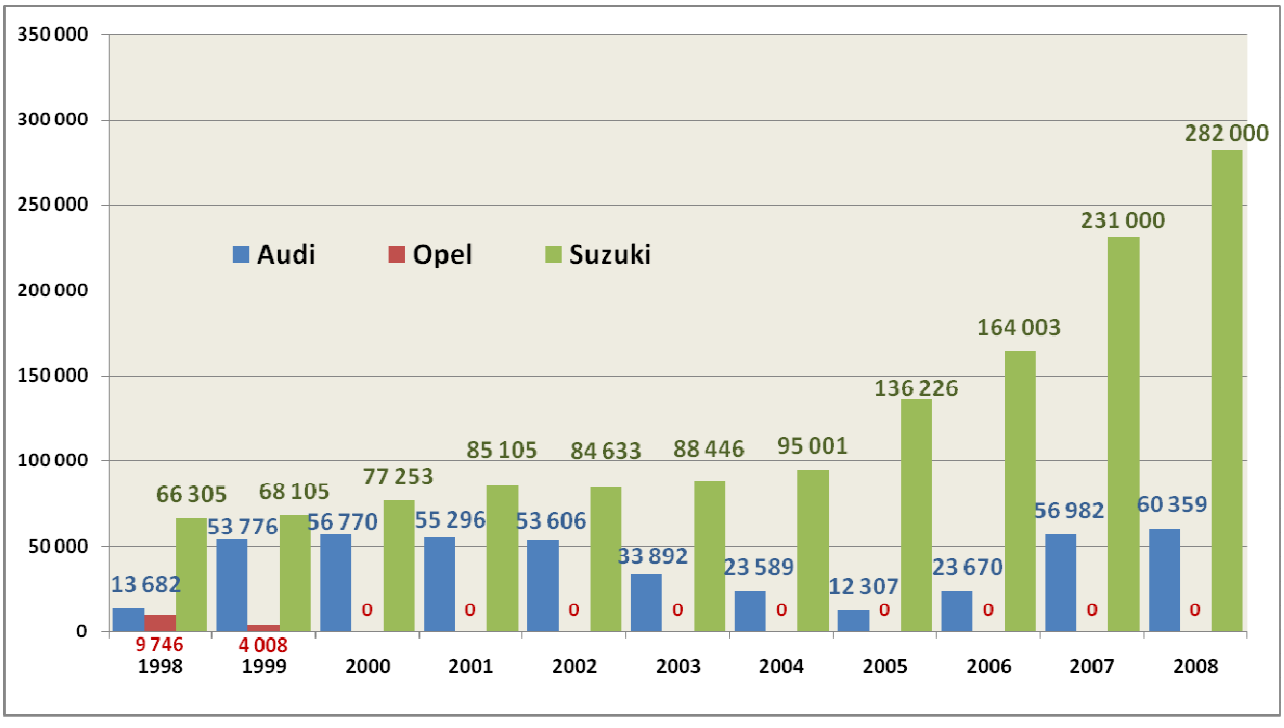
Figure 2: Motor Vehicle Export Statistics 1998-2008

Export		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CAR	Audi	12 485	53 776	56 776	55 296	53 606	33 892	23 589	12 307	23 670	56 982	60 359
	Opel	1 785	3 576	0	0	0	0	0	0	0	0	0
	Suzuki	42 001	35 546	49 499	56 120	49 081	50 111	65 972	107 352	127 471	200 000	248 600
	SUM	***56 271***	***92 898***	***106 275***	***111 416***	***102 687***	***84 003***	***89 561***	***119 659***	***151 141***	***256 982***	***308 959***
COMM. VEHICLE	Rába	27	7	10	0	0	0	0	0	1 920	no data	no data
	Schwarzmüller	712	690	910	830	835	937	1 290	1 425	no data	2 225	2 300
	Others	28	7	102	666	58	793	104	0	no data	no data	no data
	SUM	***767***	***704***	***1 022***	***1 496***	***893***	***1 730***	***1 394***	***1 425***		***2 225***	***2 300***
BUS&COACH	Ikarusz	837	207	623	534	172	191	50	0	no data	no data	no data
	NABI	456	510	660	866	736	763	685	839	no data	no data	299
	Rába	0	0	0	0	47	0	0	14	no data	no data	3
	Others	0	0	2	49	42	82	0	0	no data	no data	178
	SUM	***1 293***	***717***	***1 285***	***1 449***	***997***	***1 036***	***735***	***853***	no data	***361***	***480***
Total Sum:		**58 331**	**94 319**	**108 582**	**114 361**	**104 577**	**86 769**	**91 690**	**121 937**	**153 061**	**259 568**	**311 739**

Source:AHAI (Association of the Hungarian Automotive Industry)

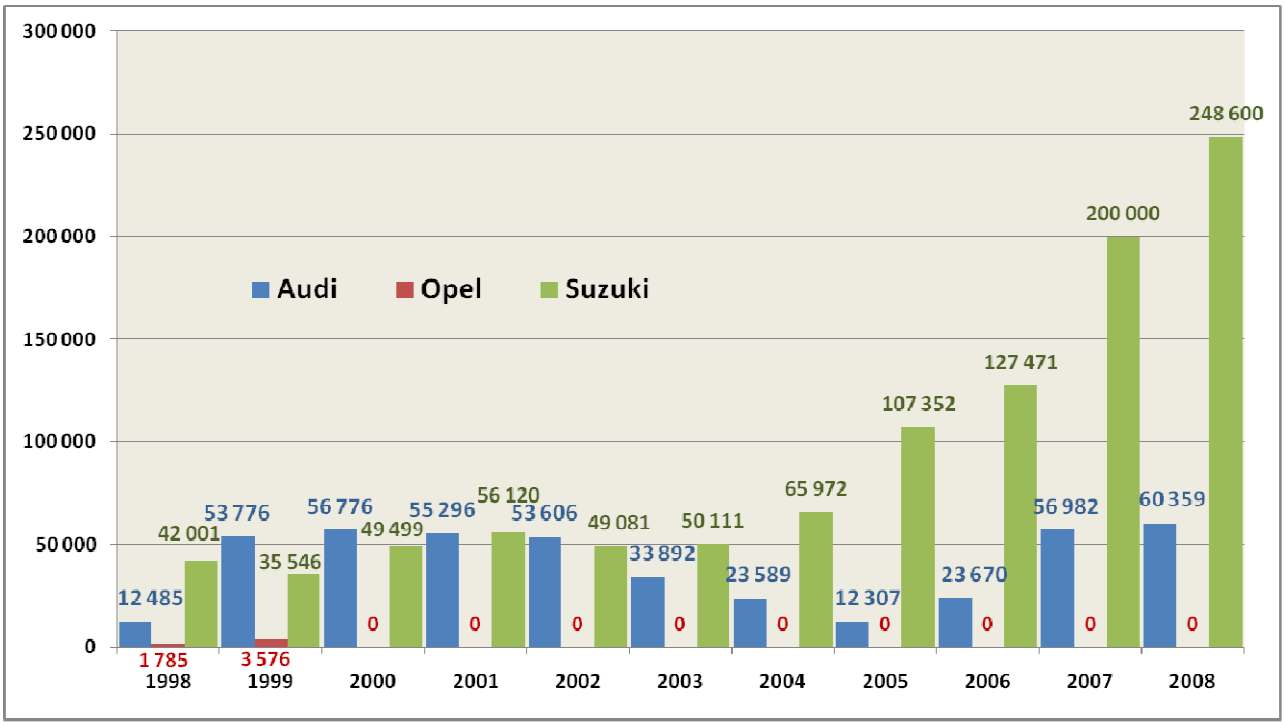
Please note, that the complete production of Audi Corp. made in Hungary is counted totally for export. Directly there is no sale for the domestic market like in the case of Suzuki Corp. Besides car industry there is only remarkable export-oriented production related with NABI buses (North-American market) and with Schwarzmüller (trailers, tanks, tows)f o European markets.

Figure 3: Production of Hungarian based car manufacturers 1998-2008



AHAI (Association of the Hungarian Automotive Industry)

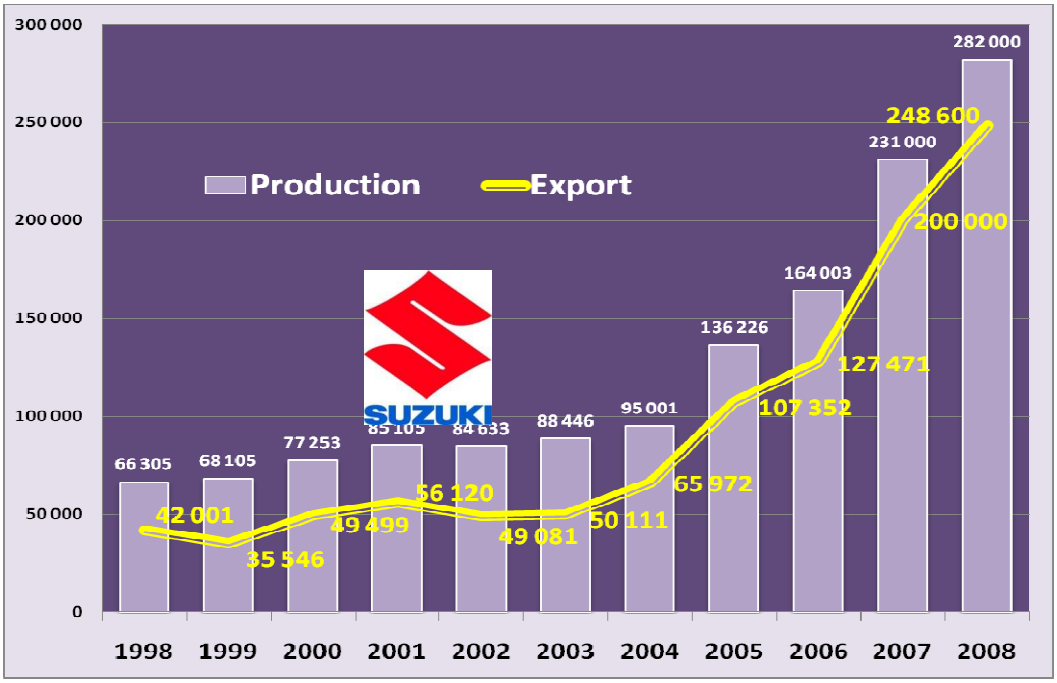
Figure 4: Car export of Hungarian based manufacturers 1998-2008



Source:AHAI (Association of the Hungarian Automotive Industry)

Compared these two diagrams above we cannot depict significant differences or inflection between the trend lines of production and export. Audi has always produced cars (besides its huge engine manufacturing branch) only for export, Suzuki was active successfully to develop itself to the most famous domestic car brand from the early 1990es. Suzuki's developments serve mainly for export-expanding objectives.

Figure 5: Production and export of Suzuki-Hungary Corp. 1998-2008



Source: AHAI - Association of the Hungarian Automotive Industry)

This diagram shows the changes of the proportion of exported cars compared to the total annual production figures at the Suzuki-plant, Esztergom throughout more than 10 years. After the developmets of 2004 this export proportion jumped well over 70% and for 2008 it topped at 88%.

Today, Hungary has a population of 10 million and a car fleet of nearly 3 million cars. In 2007, it produced 290 235 passenger cars and 3 566 commercial vehicles. The revenues for 2007 amounted to € 15.9 billion, and the automotive sector share represented 19.4% of total industrial production. The share in total exports was about 20%. There are approximately 630 motor-vehicle manufacturing companies; from this, circa 240 have audited quality assurance systems. The number of employees in the sector is approximately above 110 000 including a considerable number of highly skilled workers. Proportion of employees involved in mainunit manufacturing is 12% and in part-unit manufacturing, 88%.

According to the SWOT analyses, the main features of the automotive industry are listed as follows:

Strengths

1. significant tradition in the automotive industry in some regions, areas
2. from an investor's perspective Hungarian sectoral salaries are highly competitive with the European standards
3. well-based supplier network
4. significant academic and corporate technology R & D tradition
5. several decades of deliberate government investment incentives and FDI management

Weaknesses

- out-of-date training and insufficient number of skilled workers beyond the general knowledge
- not enough number of students in vocational training and technical university studies
- automotive clusters act formally and they are only able to survive until the end of the state-supported period
- there are few public transport airports
- sometimes difficult accessibility
- few companies carrying out meaningful R & D activities
- not so transparent administrative environment

Opportunities

- cluster organizing initiatives of major automotive companies
- transport network development generates new opportunities for investment
- inciting manufacturing-related R & D activities is a key competitve edge against foreign companies of the processing industries
- strengthen governmental activity in various investment incentives and programs

Threats:

- few number of trainees in vocational schools and students in technical higher education
- Hungarian labor force is not mobile within the country
- presence and strengthening of circular debt within the sector (esp. among supplier network actors) caused by the worldwide financial crisis
- incomplete or discarded infrastructure improvements
- relevant R & D activities can not be done because the parent company or corporate headquarter keeps these kind of activities homeland
- high level of local/municipal taxes for entrepreneurs

II. STRUCTURE OF THE AUTOMOTIVE INDUSTRY IN HUNGARY

The frame of the supply-chain in Hungary

The assembly plants (ie the OEMs) are on the top of the supply chain or 'pyramid' - Suzuki, Audi, Opel - which are subsidiaries of foreign multinational companies settled in Hungary. Hungarian small and medium enterprises must meet the requirements of these automotive giants to become suppliers. The first-tier suppliers are large companies that are directly linked to the assembly plants. Their task is to bring together other levels of suppliers, they manage integrator tasks. Among the world's 30 leading first-tier automotive suppliers the followings have sites in Hungary: Audi, Bosch, Daewoo-MGM, Delphi Calsonic, Delphi-Packard, Denso, GM/Opel, Knorr-Bremse, Mitsui, Musashi, Suzuki, U-Shin, Valeo, Visteon.

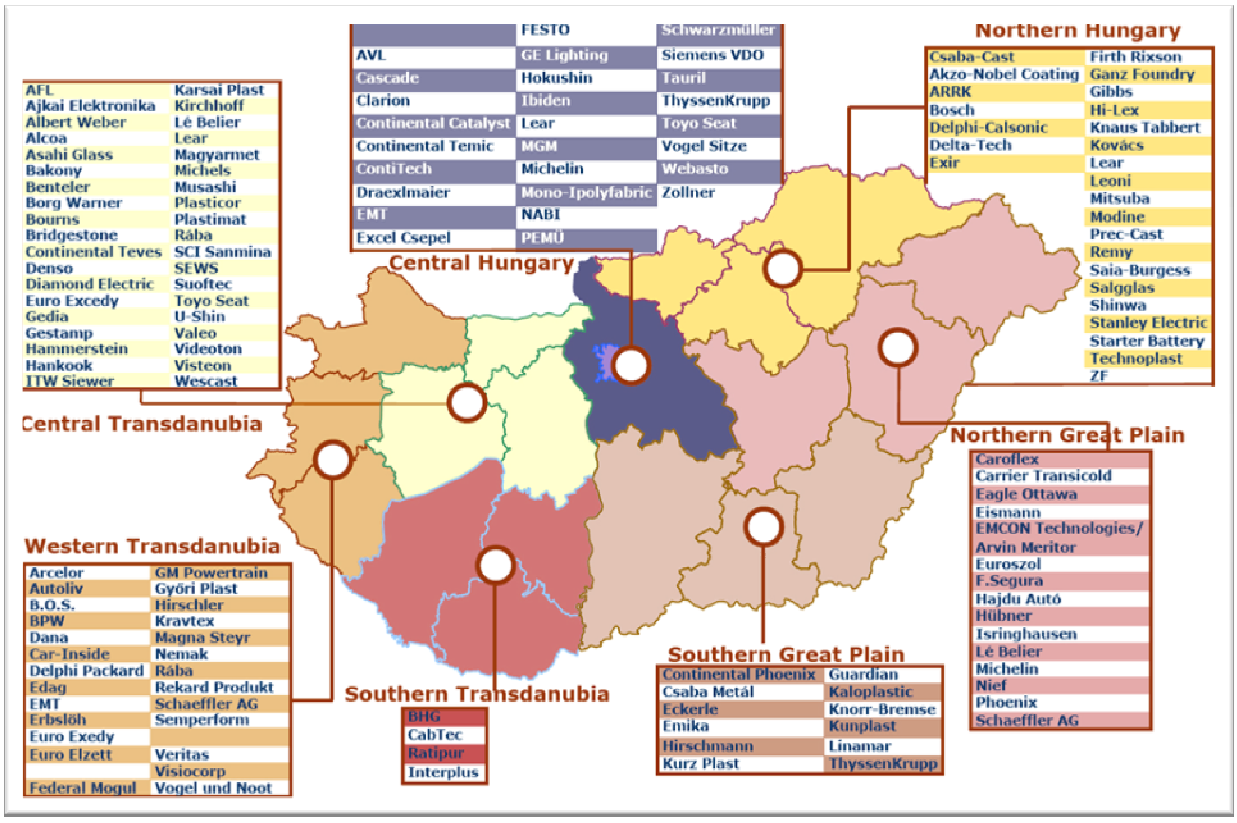
The second-tier suppliers produce the components of the more complex assembled parts, such firms are for example the Bakony Autóalkatrészgyártó Co., Rába Mór Ltd., Videoton Holding, Kaloplasztik, Ajka Electronics Ltd., Kunplaszt-Karsai Co.., Pannonplast Group. Medium-sized businesses also appear among second-tier suppliers.

Within the group of third-tier suppliers we can find the small and medium-sized businesses producing relatively simple components. I would mention such firms like ARMAFILT, the KVJ-Works, the Rák Antenna, Ratipur or the Tatabánya Idomrugó (springs, spirals).

The lowest level rounds up the 'umpteenth-tier' suppliers. These companies produce spare parts in the frame of lease-work. At this level the proportion of Hungarian property is significant, while only low profit is realizable.

According to a survey of IKT (Industrial Economics Research and Consulting Ltd.) the international companies settled in Hungary are open to increase the ratio of their Hungarian suppliers, but the proportion of domestic suppliers is still very low.

Figure 6 – Automotive industry suppliers in Hungary



Source: ITD Hungary

Some figures about the Hungarian supplier ratio:

- Audi more than 10%
- GM-Opel Engines 10-20%
- GM-Alison, Transmission 30%
- Suzuki 40-50%
- Rába-Detroit Diesel 40%
- Lear Automotiv approx. 10%
- Visteon 10-15%.

Still there are only a few Hungarian companies with own capital among the Hungarian suppliers of Audi, Opel, Lear, Visteon. This is because of the above-mentioned economic divide, which can only be superable with the increase of the financial strength of Hungarian-owned companies.

The performance of the Hungarian supplier industry is very low concerning the added value, 7-10 percent in average. The high value-added products are imported, reaching 20-80 percent of the total added value.

There is a significant difference between the green field and brown field investments related to their added values. Surveys have shown that in Hungary the developments invested in brown field sites produced way more added value (circa 20-50%) than green field investment with only 0-10 percent. It is a crucial factor to develop industrial parks for settling down those investors who are useful for the whole Hungarian economy.

The Hungarian structure of the supply chain of the automotive industry shows a bipolar system. In our country the subsidiaries of multinational companies had appeared with a

well-capitalized, high technology background along the influx of FDIs. They became the key control and production-organizer actors of the domestic value chain. The Hungarian-owned enterprises could not be established at the same time due to the absence of domestic capital. Therefore there were no domestic firms bridging integrator companies operating with foreign capital and domestic small and medium-sized enterprises enabling them to get involved in the supply chain.

It challenges the views of a simple dichotomy in the CEE automotive supplier industry, in which foreign firms exclusively occupy higher tiers in the supplier hierarchy, typified by high value-added production, while domestic firms are found exclusively in the lowest tiers, typified by low value-added production.

European Union membership has enabled our country to become a part of a significant and rapidly growing market. Within a network industry like the automotive industry we can reach the goal that third-country investors do not only install the less added value productive assembly plants in Hungary but they could bring along their first- and second-tier suppliers which can integrate the Hungarian companies in the automotive supply network. We only have to exploit the benefits of the internal market access and country-specific advantages.

It is important to highlight the role of research and development in the attraction and support of capital in the economy. The settler or already present capital should be encouraged to move towards a higher level in the production value chain. Hungary cannot maintain its competitiveness in the fight for capital against the similar low-cost Asian and European countries. We can succeed only if Hungary can always produce the highest up-to-date technology intensive products - see the example of Singapore and South Korea - with domestic know-how as well. This is the only way we can resist the attraction of low-cost countries and thus we will be able to keep cost-sensitive industries, which have become a driving force in the economy.

The automotive industry has been strongly affected by the crisis. Besides the effect the crisis has had on individual suppliers, the whole supplier system seems to be in transition. In the future, the concentration of the sector may further increase, the supplier relationships may deepen, the role of cooperations may also become more important, and the higher energy prices and the growing significance of environmental aspects may trigger a technological change as well. These factors may also generate changes in the current Toyotist supplier system. The key question is whether Hungarian suppliers can keep their positions in the new environment. Empirical research and cluster-analysis, based on in-depth corporate interviews with the suppliers of Suzuki, identified four clusters of suppliers in Hungary. The groups of ‘domestic enterprises’, ‘heterogeneous domestic middle of the pack’, ‘large foreign firms’ and ‘rejuvenated dinosaurs‘ will probably join to the value chain in different ways. Company size and the ability of participation in tech nological cooperation may become the most important competitive advantages in this new environment.

III. RESEARCH AND INNOVATION

Due to the structural changes of the past few years, automotive investments in Hungary today tend to be those that generate higher added value, and multinational companies are outsourcing an ever-increasing share of their innovation activities to local automotive SME suppliers.

In order to foster the propensity for innovation and nurturing R&D-related talents, the Association of the Hungarian Automotive Industry (AHAI) has worked out a plan for the Automotive and Transportation Competence Centre (ATCC), which will be at the heart of future developments of the Hungarian Automotive Industry. Government programmes sustain the extension of the network of Automotive Competence Centers to complement the Regional University Knowledge Centers as R&D bases, in order to establish a more efficient cooperation among multinational companies, SMEs (in the supply field) academic research institutes and other relevant institutions.

Automotive research is also expected to benefit substantially from other initiatives such as the "Research and Technology Innovation Fund Act" adopted in 2004.

Professional education in the Hungarian automotive industry stands on strong foundations: the engineering traditions and experience gained in previous production and planning are complemented by excellent primary and secondary education (including vocational high schools with focused technical curricula), and a superb system of technical colleges and universities renowned for training of engineers. Among the most important universities providing automotive education one can list the Budapest University of Technology and Economics, Széchenyi István University, Győr, University of Miskolc and Pannon University in Veszprém.

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 Gyor and the Kecskemet 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 Veszprém. 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 ad-hoc character. The new Research Centre of Motor Vehicle Industry Electronics and Logistics being built with 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

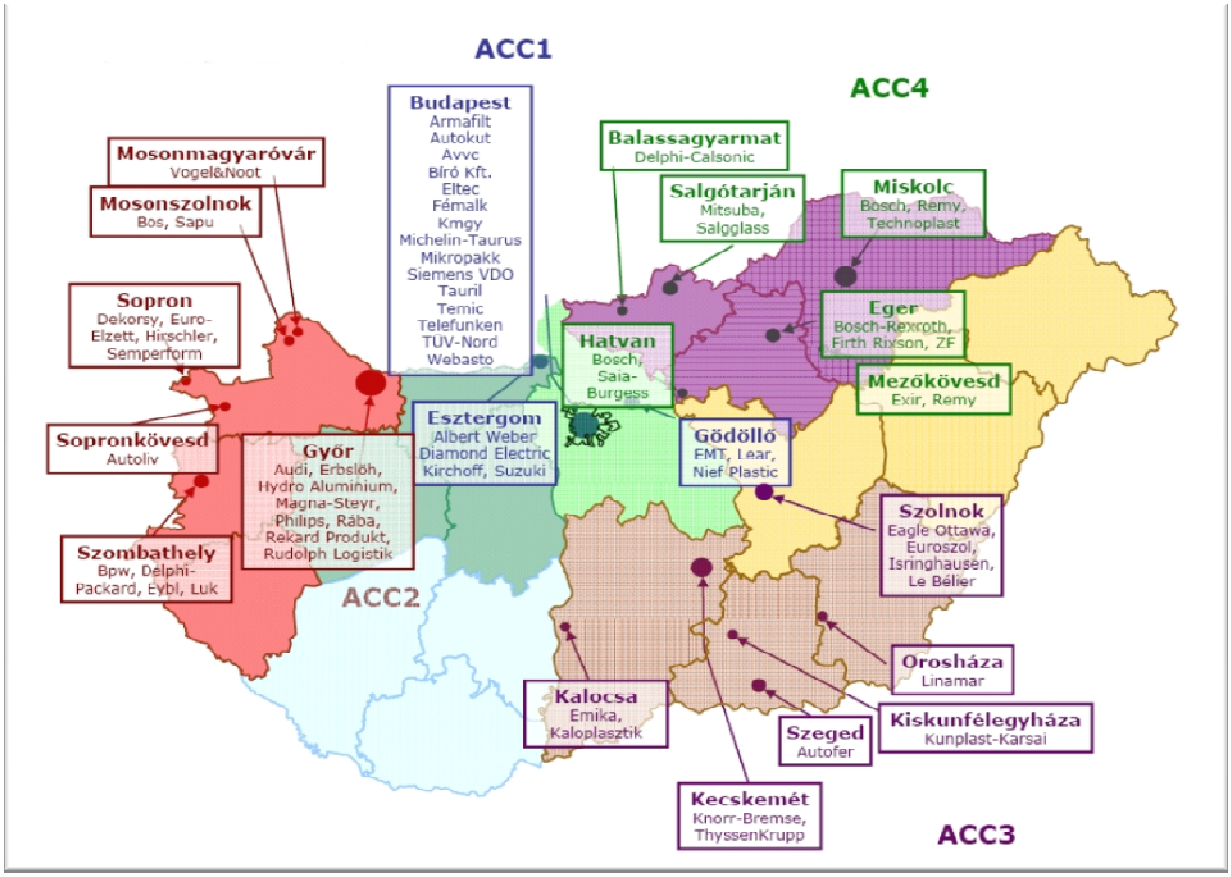
University, the Industrial Park in Győr and the Innovation Centre targeted at facilitating technology ad knowledge transfer towards SMEs.

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 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.

Automotive Competence Centres

Automotive Competence Centres build and maintain the cooperation among manufacturing companies, local and regional higher educational and academical research institutes. ACCs help SMEs get involved in big companies's R&D activities. ACCs help foreign companies get embedded into Hungarian economy. As R&D centres ACCs foster knowledgetechnology transfer, improve innovation capabilities.

Figure 7 – Automotive Competence Centres in Hungary



Source: ITD Hungary

Automotive R&D Centres in Hungary

The European Institue Of Innovation And Technology (EIT)

In summer 2008, EU ministers chose Budapest to host the headquarters of the European Institute of Innovation and Technology. The institute concentrates on the fields of energy, climate change and information technology with the possibility of further broadening its areas of study.

Advanced Vehicles and Vehicle Control Knowledge Centre, Budapest University of technology and Economics

Research extends to new areas of automotive technology-related research such as the control of vehicle fleets, vehicle-environment contact-based control, and control on the vehicle level. Cooperating partners are Knorr Bremse, Thyssen Krupp and TÜV Nord.

Regional University Knowledge Centre for the Vehicle Industry, University of Győr

The Knowledge Center operates as a scientific and technology innovation center, which coordinates a regional R&D network in cooperation with the private sector, thus enhancing the competitiveness of the country as well as the technological and economical development of the region. The Knowledge Centre serves the research and development needs of the automotive industry in the area of Győr, such as Rába Undercarriage Ltd, Borsodi Workshop Ltd. and the SAPU Partnership. Research focuses on key pre-manufacturing technologies and finishing processing; primarily shaping processes, such as casting and mould-shaping of metals and manufacturing technologies for plastic parts.

College of Dunaújváros, Department of Mechanics and Mechatronics

The College offers a range of automotive technology-related testing and research services, including the determination of force characteristics of control devices and sensors (ABS), dimensional and fatigue tests of instrument boards. The College co-operates with some of the largest automotive manufacturers in Hungary, such as Bosch, Hankook and Audi. A new, complex car mechatronics test laboratory is being set up for suppliers in the metals (Musashi and DENSO) and the electronics (Bosch) industries.

Continental Teves – Veszprém

Continental started business in Hungary in 1990 and now it has majority interest in 7 enterprises in Hungary. Continental's Veszprém site, opened in 1993 and now with a workforce of over 1,000, manufactures wheelspeed sensors and sensor clusters as components for the anti-lock braking system (ABS) and the electronic stability control (ESC).

The site's development center, opened in 2001, currently employs over 180 engineers, mainly engaged in software development. Continental, one of the three largest employers in the region, intends to continue to expand its Veszprém site into a state-of-the-art development center over the next few years and invest in the essential infrastructure.

DENSO Manufacturing Hungary Ltd. – Székesfehérvár

DENSO Manufacturing Hungary Ltd. (DMHU) as a part of the DENSO Group has been operating in Hungary since July 1997. The two main shareholders of the company are DENSO Corporation and DENSO International Europe B.V. with a proportion of 70 percent and 30 percent ownership, respectively. In Hungary, this is DENSO's first investment, while in Europe the company is the fifth manufacturing plant. The plant which was established with an investment of 75 million € is located in the Sóstó Industrial Park in Székesfehérvár. The Japanese management selected the town among 14 European cities.

Audi Hungaria Motor Kft. – Győr

AUDI HUNGARIA MOTOR Kft., a fully owned subsidiary of AUDI AG, builds over 1.9 million engines there each year, and assembles the Audi TT model range and the A3 Cabriolet, among other vehicles, in tandem with the Ingolstadt plant. Audi Hungaria is the principal engine supplier of the Audi and Volkswagen Groups, one of Hungary's highest revenue enterprises and also one of the country's biggest exporters.

Development and planning: as well as managing the plant's engine production operations, the Technical Centre handles engine development tasks for AUDI AG. It is also home to specialists in the production planning and information technology areas. As well as the engineering centre, the complex includes an engine testing zone equipped with twelve test rigs incorporating the latest generation of test rig technology.

IV. CLUSTERIZATION IN THE HUNGARIAN AUTOMATIVE 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.

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.

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 Veszprem, the Budapest University of Technology and Economics) 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.

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 Pannon Automotive Cluster (PANAC) – www.panac.hu – was established in 2000 and now boasts 96 members. The organisation's mission is to facilitate national and international networking by providing opportunities for communication and partnerships. It also assists in company development, including surveys of supplier capacity, company benchmarking, organisation of specific automotive teaching/training programmes and technology exchanges.

The North Hungarian Automotive Cluster (NOHAC) - www.nohac.hu – was established with the participation of three TIER 1 suppliers the regional chamber of commerce (BOKIK) and the Innovation Management Cooperation Research Centre, University of Miskolc (ImKKK). By bringing together North Hungarian suppliers, business professionals and academic experts, the cluster members hope to boost the innovative spirit, thus competitiveness and profi tability in the region.

Hungarian Vehicle Development Cluster (MAJÁK) - www.engineeringcluster.com - was founded in January 2009 by six Hungarian engineering SMEs, all with wide experience in international projects. HVEC implements joint innovation projects, supports individual inventors and assists the establishmen of new companies and spin-offs. HVEC, co-operating with a wide network of research centres, universities and business intermediaries, offers competitive knowledge, innovation platforms and complex project management.

Table 1: Further automotive clusters in Hungary

Region	Cluster	Activitiy
North-Hungary	Supplier and Technology Development Cluster	machine industry
Central-Transdanubia	Central-Transdanubian Regional Innovation Cluster	automotive industry
Central-Transdanubia	The Automotive and Mechatronic Cluster of Ajka	automotive industry
Central Region	Mid-Hungarian Investments Cluster	investment
South-Great Plain	South-Great Plain Green Machine Industry Technology Development Cluster	machine industry
South-Great Plain	Building Industrial Technology-Development Cluster	building industry, machine industry
South-Great Plain	Machine Industry Innovation Cluster	machine industry
South-Great Plain	Sárrét Metal Cluster	metal industry

V. POTENTIALS AND CHALLENGES OF THE HUNGARIAN AUTOMOTIVE INDUSTRY

Future of Hungarian automotive industry – effects of the crisis, trends, priorities

The impact of the crisis on the automotive industry has been more severe than for any other industry except housing and finance (fall in orders and sales, layoffs – especially leased workers, reduced working time). In spite of the recent and dramatic effects of the 2009 economic crisis on the automotive industry, it is important to begin with a longer-term perspective.

In the more and more globalized automotive sector organized in global value chains, competition is sharper and sharper. Competition pressures resulted in the concentration of producers and suppliers, in other cases their strategic alliances and this process has become even stronger during the crisis. The other important impact of the crisis was a further increase in cost pressures, in certain cases even at the expense of quality. This resulted in a restructuring process even in supply chains, many companies change their suppliers, look for cheaper or more efficient partners, in some cases under compulsion because their former suppliers went bankrupt.

To date, the advantage of Hungary is its well educated and fairly cheap labour, which however isn't a long term perspective. In order to keep automotive factories in Hungary we need to embed them in their environment, this means on the one hand the operational environment and the supplier environment. Without this in case of price advantage manufacturers will move on unless the added value (primarily R&D) of Hungarian suppliers is holding them back.

An overall development is required again. However, now the focus is more on education, R&D and supplier chain. This is on the one hand because the continuous decay of education and bad representation of Hungarian owned SMEs among suppliers which once again can be lead back to education, on the other hand because technology is provided by the investor. But as for the technology, practical education should cover the most recent instruments and methods.

Further aspect of an overall development would be the complexity of car manufacturing, from its integrative point of view.

In order to retain and improve Hungary's automotive status – and to revive its economy – conditions of SMEs are one of the key parameters. There are tens of thousands of SME active in automotive industry supply. In order to improve their position several measures have to be taken which are or aren't depending on them. The ones depending is R&D, overall enterprise development (logistics, finance, management) which are required for a supplier status even at lower tier levels. The other factors independent from SMEs are state regulations, common charges etc. which are especially bureaucratic and slow, thus they cause shortfall of revenue and are lowering competitiveness. Latter conditions are subject to change as the state recognized that its apparatus is a hurdle in the competition for FDI. However, it is still not a guarantee for more Hungarian owned suppliers. Although Hungary has one of the most beneficial research support system few are involved in R&D and changing the attitude of companies will prove harder than changing laws. R&D is however the motor of the automotive industry which is especially true in the light of recession. Present suppliers simply don't care about R&D due to short term financial consideration. However, it isn't only the fault of SMEs, it is also the fault of education which is going continuously from bad to worse since regime change. It is also rankling that fifty percent of graduates can't receive their diploma due to the lack of one or more language exams. This is

also a huge disadvantage for the country in the competition for FDI, e.g. Renault decided for Romania (among others) due to the high ratio of French speaking population.

Conditions for a successful automotive industry changed toward the past twenty and forty years. Now we don't have a voice in technology, instruments, production line are brought by the investor But the branch is now more knowledge dependent than ever before, education and R&D is sought.

It is obvious that the competitive advantage based only on cheap labour has been exhausted by now. With this in mind the intellectual environment must be achieved for manufacturers. Development of education, R&D and SMEs must correspond once with the economy development, among the frames of a long-term strategy, especially in spite of that Hungary has no natural resources present, thus our most valued good is knowledge which is more easily produced when education and R&D have a continuous feedback of industrial needs. From FDI point of view this is essential to attract it to the country and from the country's point of view it is essential for SMEs to be able to join the supplier chain with increasing numbers at increasing tier level. As far as companies themselves are concerned firm characteristics that can help them in their successful adjustment to the crisis situation (and beyond or even before the crisis to the changes in the business environment due to the emergence of cheaper Asian producers) are as follows: offering additional services to buyers and thus a move towards higher added value; diversification; introduction and application of modern company organization techniques; flexibility and quick reactions; and for small sized companies it was an advantage if they had no substantial credit stock at the eruption of the crisis.

The Hungarian automotive sector, which consist mainly of automotive suppliers and less of OEMs, is strongly embedded in the international value chains, partly because all OEMs in Hungary are foreign owned and this is also true for the majority of first tier suppliers. Thus for Hungarian (and Hungarian owned) automotive suppliers the competition pressure is very strong. For those, who produce standardized, less complicated parts and components, competition has become sharper with the emergence of Chinese, Indian and other Asian suppliers. It is obvious, the competitive advantage, based only on cheap labor has been eroded by now to a great extent. Certain automotive suppliers tried to reduce the competition pressure even before the crisis to strengthen their position as a supplier. The successful companies usually provide additional services to the buyer: they try to establish a close cooperation with it. They move towards activities in which their Chinese or other Asian counterparts can not follow them (for example own tool shop, design, development unit, etc). They provide the buyer with various services, thus they strengthen their supplier position. Another possibility for medium and small sized Hungarian suppliers is to increase their capacity by establishing strategic partnership with other firms.

In this situation, one of the possible OEM strategies is the further price reductions, an element of which can be looking for new, cheaper suppliers, who provide at least the same quality. In this process, successful Hungarian suppliers can also take part. (It is also a possible OEM strategy, that price reduction is realized at the expense of quality, in these cases Hungarian (owned) suppliers can hardly compete with their Chinese or Indian counterparts.) Another possible OEM strategy is to look for suppliers with whom closer co-operation can be established because they are able and capable to carry out the required activities (e.g. development but also other additional services). In these cases Hungarian (owned) suppliers can also play a role and gain further market shares.

Finally, a strategic priority should be the accelaration of clusterization processes in the automotive industry which could bring significant competitive advantage for the participating companies.

From the point of view of economic policy, it is important to realize that competitive advantages based only on cheap labour are being eroded by the emergence of cheaper Asian production locations. For these companies, economic policy tools are important in order to direct them towards the above mentioned strategies and activities. For the successful companies, the role of economic policy is to help to strengthen their strategy.

Summary of trends and challenges

Main actual trends in automotive industry

- cost reduction,
- acceleration innovation cycles,
- development of new technologies and products,
- building of collaborative networks and clusters,
- energy and environment.

European tendences

- The automotive industry keeps growing in every segments.
- In the automotive industry R&D demand is growing, but there is a lack of specialists in Western Europe.
- Searching new development sources because of lead-time and cost reduction.
- CEE is the new regional center of automotive production.
- CEE has the supplier base and innovative ability and capacity.

Hungarian challenges

- Implement higher value-added production (the low wage labor for lease-work is not a realistic option).
- Increased efforts in attracting R & D activities , bounding it to the production (we have to target those fields of high-tech, which are cost sensitive, but are potentially at risk in the Far Eastern countries).
- Increased development of Hungarian SMEs, strengthening their innovation capability in order to be capable manufacturing units with a higher intellectual contribution-demand.
- Increased cooperation among industry actors, higher education and academic research institutes:
    - research and development tasks
    - providing the next generation of capable engineers
    - exchange of information.

Opportunities

- Increasing EU interest towards „low cost" countries:
    - suppliers,
    - R&D,
- move developers/designers towards SMEs,
- sustain the competencies,
- putting domestic suppliers in better positions,
- threats (India, China).

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Notes on the Automotive industry in Germany -Saxony Region

WIRTSCHAFTSFÖRDERUNG SACHSEN

By Saxony Economic Development Corporation

CONTENTS

1. Quantitative and qualitative analysis of the automotive industry in Saxony

1.1 Introduction to the Saxon automotive industry and its main features

Motor vehicles from Saxony have been providing people with mobility for more than one hundred years now. "Production in Partnership", "Just-in-Time" (JIT) and "Just-in-Sequence" (JIS) requirements of the automotive industry a strong supply chain has been developed. Local small and medium-sized businesses developed into reliable partners of leading international car manufacturers. Core competences such as body production, powertrain production, interior parts, electronic parts production and safety parts production have been established. The production sites and developmental centers active in the automobile industry in Saxony produce components and equipment required for manufacturing automobiles.

Today, with a 24 percent share in industry turnover and a 38 percent share in exports, car manufacturing is Saxony's major industry, employing more than 70,000 people in about 750 companies including service providers and equipment suppliers.

The so called "Autoland Saxony" has four car manufacturers (BMW, NEOPLAN, Porsche, and Volkswagen) and more than 500 automotive suppliers (approx. 750 companies including service providers and equipment suppliers) with over 70,000 employees. Three universities, five universities of applied sciences and more than 50 university and extra-university research facilities are the base for strong research and development (R&D) skills in Saxony.

1.1.1 100 years of "Autoland Saxony"

May 10, 1904, is considered to be the inception of Autoland Saxony. August Horch founded the A. Horch & Cie. Motorwagenwerke AG corporation in Zwickau. This marked the beginning of the rapid technological and economic development of this branch. After a dispute with the executive board of the A. Horch & Cie. Motorwagenwerke AG corporation, August Horch established his second enterprise in Zwickau. Since he was not allowed to use the name Horch, he chose the Latin translation of his name – which is Audi. On April 25, 1910, his newly founded company was named Audi Automobilwerke GmbH. With the Audi K model, August Horch introduced user-friendly elements as a standard feature to Germany's automobile community in 1921: left-hand drives and central gearshifts. Four interlocking silver rings symbolize the AUDI brand. The origin of this logo dates back to 1932. Back then, the four Saxon automobile builders Horch, Audi, DKW, and Wanderer merged as the Auto Union in Chemnitz.

Not without reason was the Trabant called the "Plastic Bomber." In 1955, the P 70, the forerunner of the Trabant, was introduced to the public as Germany's first consumer vehicle having a mass produced plastic body. Since deep-drawing sheet metal was scarce, the passenger car's body was built with thermosetting plastics. The resin-impregnated fibers were in no way inferior to sheet steel or fiberglass reinforced plastics. The Trabant 1.1

reached the market with a Volkswagen four-stroke gasoline engine in 1990. Despite this innovation, demand decreased rapidly since Volkswagen started to build its first Saxon factory in Zwickau/Mosel and commenced with the production of the VW Polo. On April 30, 1991, production of the Trabant was discontinued.
The establishment of the Volkswagen Sachsen GmbH corporation in December 1990 marked the beginning of an ambitious Volkswagen AG project. The objective was to set up a competitive production site for Volkswagen vehicles and engines in one of Germany's most traditional automobile construction regions. Since 1990, approximately 3,000,000 Volkswagens and 8,000,000 VW engines have been built in Saxony. In February 1998, the Volkswagen corporation and the City of Dresden held initial talks on a new business setup. The decision in favor of the Straßburger Platz square in the heart of the city was announced to the public in early 1999. Automobile production in the "Transparent Factory" was officially launched in December 2001.
The Dr. Ing. h.c. F. Porsche AG corporation announced its decision to build the assembly plant for its third model series in Leipzig. On an area of approximately 90 hectares, the Porsche AG corporation has been manufacturing the luxury off-road vehicle "Cayenne" since August 2002 and produced a total of 1,270 vehicles of the limited edition super sports car "Carrera GT" between August 2003 and May 2006. To date, Porsche has invested a total of 127 million euros into its Leipzig location where 400 people are currently employed. By 2009, this amount was increased by another 120 million euros because a new 25,000 square meter production hall was built for the new four-door sports coupe "Panamera".
On July 18, 2001, it was official: Saxony was the winner in one of the fiercest international battles ever to be waged among 250 regions competing for the selection as a production site. The BMW AG corporation decided to build its new production plant for the 3 series in Leipzig. Mass production of the BMW 3 series limousine started in March 2005. BMW announced that its factory in Leipzig is to be expanded by a new pressing plant and an attached production site for components by the end of 2009. And for good reasons: Since March 2007, the factory has also been manufacturing the BMW three-door 1 series, since September 2007, the BMW 1 series coupe and since December 2007, the BMW 1 series convertible also comes from Leipzig.

1.1.2.Products and services produced in Saxony

Managers, entrepreneurs, creative developers and active employees in companies, institutions, authorities, educational and research institutions have used their opportunities to create added values in Saxony. Meanwhile there are more than 70,000 people in more than 750 companies are employed at manufacturers, suppliers, service providers or research institutions. The automotive industry in Saxony is the most important sector in Saxony today, completely competitive in comparison to whole Germany, even perhaps a Best-Practice location.
In Saxony are five assembly plants located, not only the car assembly plants mentioned in point 1.2.1. Next to the plants of Volkswagen in Zwickau, Chemnitz and Dresden, Porsche in Leipzig and BMW in Leipzig, there is an assembly plant of NEOPLAN in Plauen. Since 1992, buses have been produced at NEOPLAN Omnibus GmbH in Plauen. NEOPLAN Group legally belongs to MAN AG and produce NEOPLAN coaches and intercity buses.

- Volkswagen car production in Zwickau: body workshop, assembly lines, paint workshop

- Volkswagen engines production in Chemnitz: engine assembly workshop and transmission assembly workshop
- Volkswagen car production in Dresden: assembly lines
- BMW in Leipzig: body workshop, assembly lines, paint workshop
- Porsche in Leipzig: assembly lines

The producers of automotive components have specialized themselves in different fields of automotive production, which are drive system/chassis, automobile electronics, interior/passenger protection systems, car body, automotive engineering, plant and mechanical engineering and commercial vehicles. Some companies for each section are shown in the following overview:

- *Drive systems/chassis:*

  1st-tier: Continental Automotive GmbH, KOKI, GKN Driveline Deutschland GmbH, Mahle Behr Industry Motorcycle Components GmbH, Gillet Abgassysteme Zwickau GmbH Tenneco and others

  2nd-tier: UKM Fahrzeugteile GmbH, MFT Motoren und Fahrzeugtechnik GmbH, Neue ZWL Zahnradwerk Leipzig GmbH, KOKI TECHNIK Transmission Systems GmbH and others

  Services: Voith Industrieservice GmbH, Benseler Sachsen GmbH, HQM Sachsenring GmbH and others

  Equipment: USK Karl Utz Sondermaschinen GmbH, SITEC Industrietechnologie GmbH and others
- *Automobile Electronics:*

  1st-tier: AB Elektronik Sachsen GmbH, FEP Fahrzeugelektrik Pirna GmbH & Co. KG, ADZ NAGANO GmbH, digades GmbH, BuS Elektronik GmbH & Co. KG; Sumitomo Electric Bordnetze GmbH, Siemens AG - Automation & Drives System Engineering and others

  Services: IAV GmbH, Bertrandt Technikum GmbH and others
- *Interior Systems:*

  1st-tier: Johnson Controls GmbH & Co. KG, Faurecia, WEIDMANN Plastics Technology AG, Car Trim GmbH and others

  2nd-tier: Minda KTSN Plastic Solutions GmbH & CO. KG, plastic concept gmbh, , C. H. Müller GmbH, Automotive Interior World Production GmbH and others

  Services: Grupo Antolin Logistik Deutschland GmbH Werk Sachsen, Schnellecke Sachsen GmbH, Stemke Kunststofftechnik, A-Form AG and others
- *Passenger Protection Systems:*

  1st-tier: Autoliv Sicherheitstechnik GmbH, TAKATA-PETRI GmbH and others

  2nd-tier: Scherdel Marienberg GmbH, SF Automotive GmbH, Car Trim GmbH and others
- *Car Body:*

1st-tier: Tower Automotive Presswerk Zwickau GmbH & Co. KG, Hydroforming Chemnitz GmbH & Co. KG, Brose Fahrzeugteile GmbH & Co. KG and others

2nd-tier: Karosseriewerke Dresden GmbH, CAWI Stanztechnik GmbH, UFT Production GmbH, DMB GmbH and others

Services: Thyssen Krupp Stahlservice, Kuka Werkzeugbau Schwarzenberg GmbH, Anchor Lamina GmbH, Aweba Werkzeugbau GmbH, OZF Coating GmbH & Co. KG and others

- *Automotive Engineering:*

  Services: IAV GmbH, FES GmbH - Auto-Entwicklungsring Sachsen GmbH Zwickau, HOERMANN-RAWEMA GmbH Chemnitz and others

- *Plant services:*

  Services: K+L Elektrotechnik GmbH, Logsol GmbH, Carnet GmbH and others

- *Mechanical engineering:*

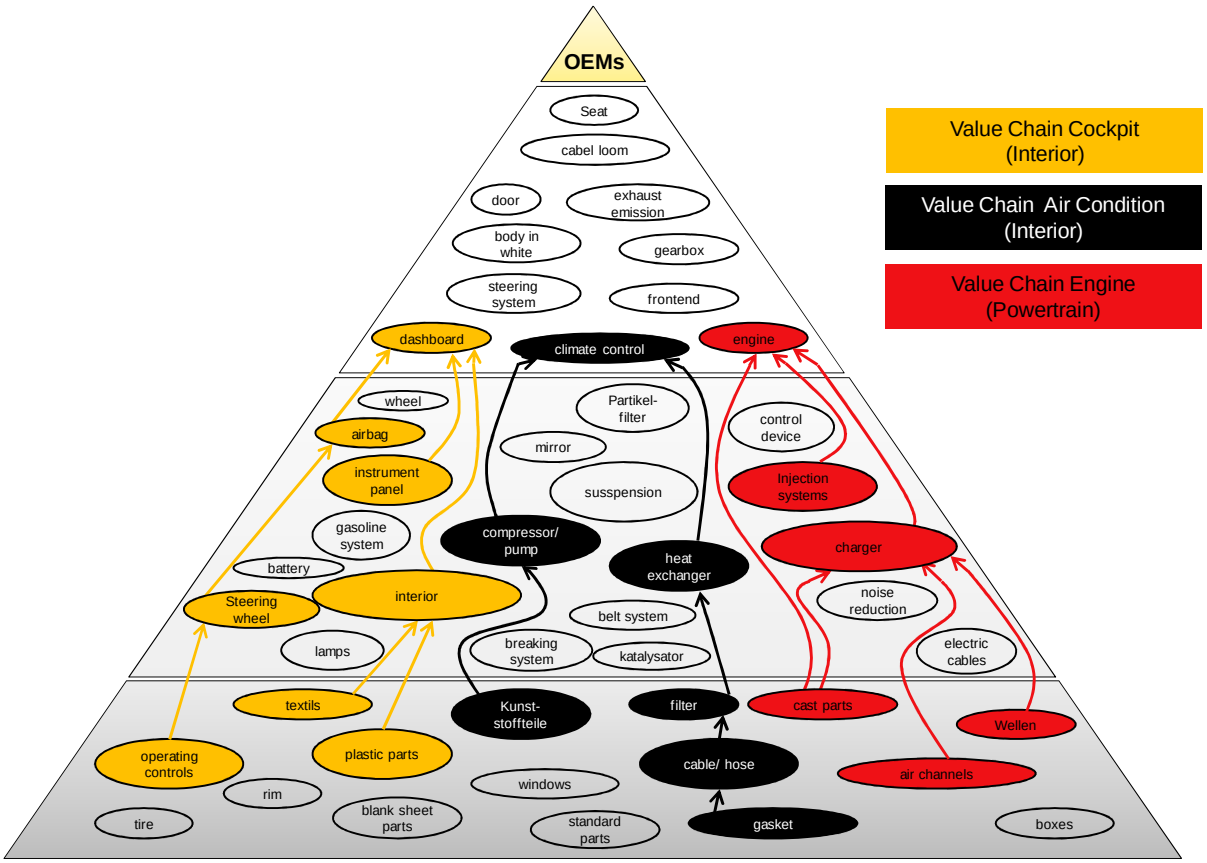
  1st-tier: MBN Maschinenbaubetriebe Neugersdorf GmbH, Starrag Heckert GmbH, NILES – SIMMONS Industrieanlagen GmbH, Xenon Automatisierungstechnik GmbH, Purtec GmbH and others

  2nd-tier: FAD Dresden, K-Metall GmbH, GFI Engineering and others

- *Commercial Vehicles:*

  Product: SAXAS Nutzfahrzeuge Werdau AG, M&V GmbH

For structuring the Saxon automotive companies, the general supplier pyramid shown below is used as base. As an example we can see the engine module, the dashboard module and the air condition module. According to that, in Saxony we can find the same structural processes and division of labor.



Quelle AMZ Sachsen: general Scheme of suppling parts from part to modul

1.2 Structure of the automotive industry in Saxony

Saxony's small and medium-sized businesses developed into reliable partners of the leading international car manufacturers. That's why Saxony is one of the leading automotive regions in Germany as far as the number of OEM factories is concerned.
Based on the historic development of the automotive industry in Saxony, there are different regional hot spots of automobile production:

Quelle: Wirtschaftsförderung Sachsen, 03.06.2010

- *Region Chemnitz-Zwickau-Ore Mountains:* The strong involvement of Volkswagen in Mosel (near Zwickau) and Chemnitz led to the settlement of renowned supplier companies and activated regional and local enterprises. The region in total has about 300 suppliers and subcontractors with more than 40,000 jobs. Since 1992, buses have been produced at NEOPLAN Omnibus GmbH in Plauen. In the region are also international active suppliers located, like Magnetto (Italy) and WEIDMANN Plastics Technology (Suisse).

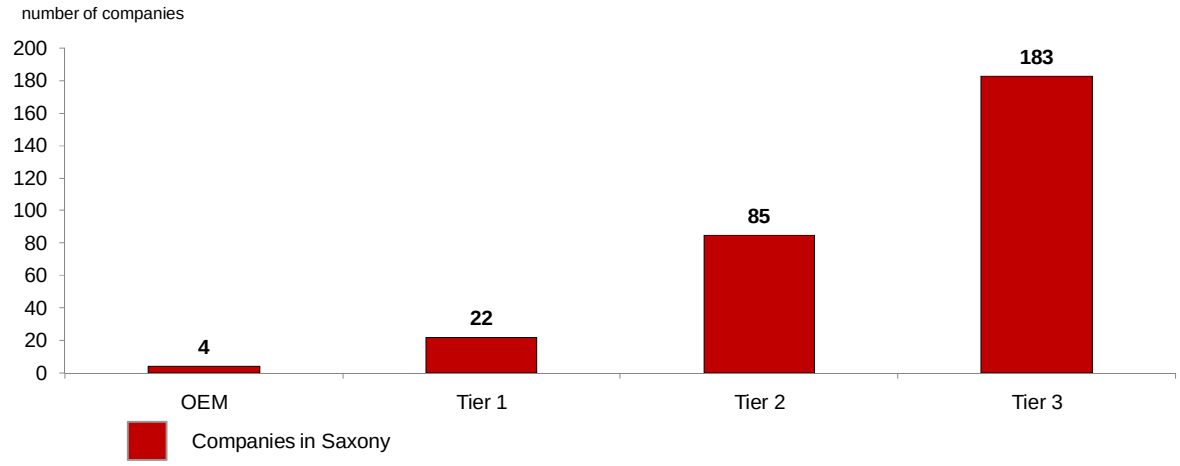
- *Region Dresden:* The "Transparent Factory" of the Volkswagen AG in the center of Dresden is a visible highlight of automotive production in the world. But also the region is leading in the field of automobile electronics and electronic research.

- *Region Leipzig:* In the last years, Leipzig became automotive logistics region in Germany. In the city the modern plant of Porsche is located, where the "Cayenne" and the new "Panamera" are produced and also the BMW Group had built their production plant in Leipzig to produce the BMW 1 and the BMW 3 series.

- *Region Zittau:* The tri-border region Zittau in the triangle of Saxony-Poland-Czech Republic is near to the big OEM-production sites of BMW and Porsche (both in Leipzig), VW (in Zwickau, Chemnitz, Dresden, Polkowice), Volvo (in Wrocław), Toyota (in Walbrzych) and Skoda (in Mlada Boleslav). Thus the region has good opportunities for new settlements from automotive sector. International active suppliers are settled in the region, because of many final manufacturers. Therefore the competitiveness of the region is high.

According to the last survey of the Saxony Automotive Supplier Network (AMZ) in May 2010, companies delivering at the moment as a direct supplier within the value chain in the

automotive industry are in summery 294 companies. The structure shows 62% 3rd-tier, 29% 2nd-tier and 8% 1st tier supplier.



Quelle: last survey of AMZ Sachsen

Taking into account the companies acting in Saxony with customers in the automotive industry, there are about 750 companies in Saxony.

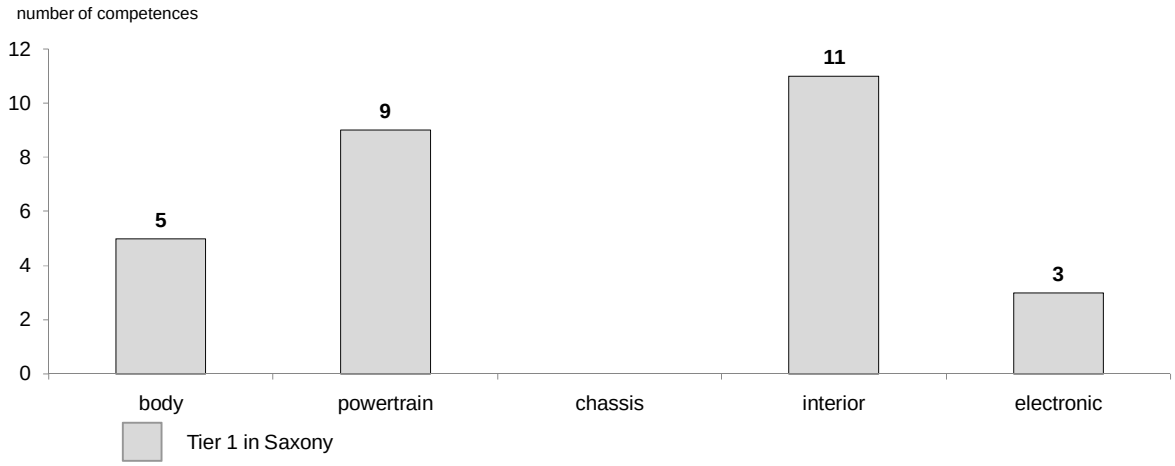
1.2.1.Automobile Assembly (OEM)

The Volkswagen AG provides jobs for more than 7,300 people in the cities of Zwickau, Chemnitz, and Dresden. Since May 1990, Volkswagen cars have been built at the vehicle factory Mosel near Zwickau. Every day, more than 1,100 "Golf" and "Passat" vehicles leave the production facility. In addition, the Mosel site has also a pressing plant and competence centers for aluminum attachment parts as well as for light and heavy plating. Since 2004, painted car bodies for the Phaeton and the Bentley have also been produced here.
VW's Automobilmanufaktur Dresden GmbH produces the top-of-the range "Phaeton" sedan in its revolutionary "Transparent Factory". With the plant, located in the central city district, VW has established the first car factory to combine industrial production methods with an assembly area open to the public. Here, customers can watch their cars being assembled.
Since 2002, the sport utility vehicle "Cayenne" has been leaving the assembly line at the Porsche Leipzig GmbH site. Between 2003 and 2006, the high-performance sports car "Carrera GT" has also been built in Leipzig in a limited quantity of only 1,270 vehicles. In spring 2009 the production of Porsche's fourth model "Panamera" started. Thus, Porsche was creating 600 new jobs in Leipzig.
The newest member of the worldwide production network of the BMW Group was built in less than three years. Production of the BMW 3 Series began in BMW AG's Leipzig Plant in March 2005 and since 2007 the plant is also producing the BMW 1 series in several editions. At present, up to 700 vehicles roll off the assembly line every day. About 5,300 people have already found a job on the factory premises.

1.2.2 Tier-1 companies

With establishing OEM Manufacturer in Saxony, tier-1 supplier has been developed close by. These are mainly international acting companies, pre-defined by the OEM. The 1st-tier suppliers in Saxony are mainly working for the customer "Volkswagen". Due to the low

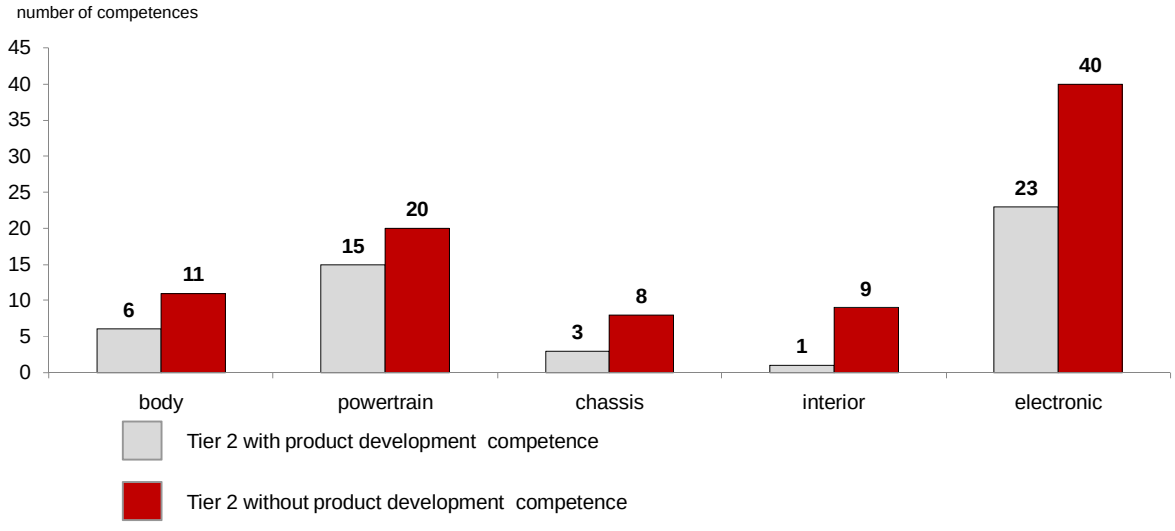
added value at Porsche plant and BMW plant, only few 1st-tier suppliers have developed near by.
1st-tier partners are handling complex commodities. These commodities are in several competence fields. The 22 1st-tier suppliers situated in Saxony are dealing mainly in interior and powertrain field, which is shown in the following graphic:



Quelle: AMZ- Expertise: Chancen und Risiken des Wandels zur Elektromobilität für die automobile Wertschöpfung in Sachsen

1.2.3 Tier-2 companies

One of the main tasks of AMZ was to open the gates for Saxon companies to get into the value chain. As potential 2nd tier supplier from Saxony many companies have been lead to the 1st-tier partner. Today we have over all 85 2nd-tier suppliers. According to the last survey of AMZ from May 2010, there are 43 companies with headquarters in Saxony and 42 enterprises of Non-Saxon based companies. Therefore the amount of extended production sites is about 50%. Compared to other regions, the share of regional based industry is high.
The following graphic shows the number of competences of the tier-2 suppliers in Saxony. Most of the companies are into two competence fields. In general, commodities involve at least two competences.



Quelle: AMZ- Expertise: Chancen und Risiken des Wandels zur Elektromobilität für die automobile Wertschöpfung in Sachsen

The strongest competences are in electronic and powertrain. Nevertheless, the number of competences with product development is with 35% lower than the competence without product development with 65%.
The current challenges of the Saxon 2nd-tier suppliers are the global market mechanisms, especially language skills, international acquisition and the capacity to produce on an international scale. Because of a shrinking margin per product in the automotive industry the 2nd-tier suppliers have a lack of liquidity to finance international operations. Taking into account the dependence to 1st-tier suppliers it is nearly not possible to become 1st-tier partner of the OEM, because main customers would be immediately competitors.
A Future of the 2nd-tier is first the internationalization with the 1st-tier partner and, on the other hand developing projects with the 1st-tier partner. Based on the decreasing liquidity in development projects, 1st-tier companies tend to subcontract development of parts and commodities. From this it follows, that 2nd-tier suppliers are forced to develop more and more parts. This decreases liquidity at the 2nd-tier supplier.

1.2.4 Tier-3 companies

Today Saxony has over all 183 3rd-tier suppliers delivering parts direct into the automotive industry. These suppliers are acting mainly as outside operations as toll-manufacturer. There are 127 local suppliers having headquarters in Saxony and 56 companies having not.
Saxon Tier-3 companies are rather competing on price than with product development competence. Wages, certification and references are the main indicators to acquire contracts. The competition is characterized by high investments and small margins per part. Successful 3rd-tier suppliers are using economies of scale.
Regarding the platform-based strategies of global OEM, the number of standard parts increase massively and the variety of individual parts decrease constantly.

1.2.5 Equipment suppliers

Equipment suppliers are a key competence in Saxony. In the historically strong industrial area Saxony many companies has been established, spin-off and transform to valuable automotive partners. Actually Saxony has many small and medium sizes companies in this field.

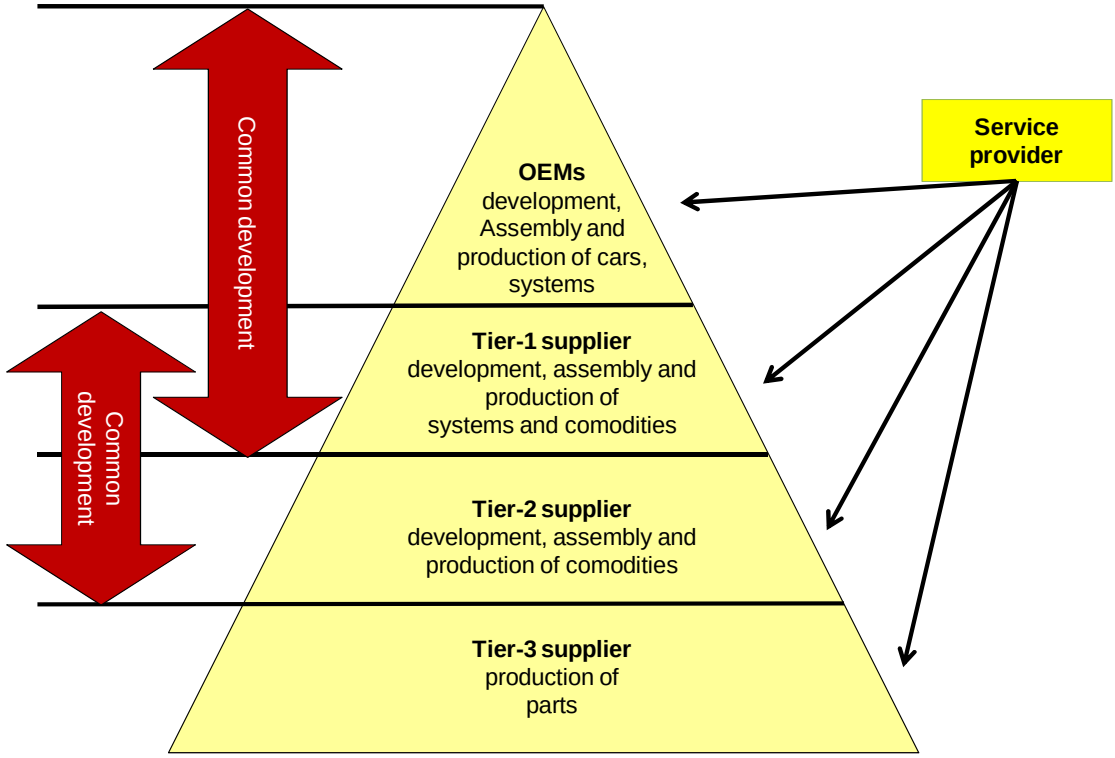
1.2.6 Service providers

The number of service providers for OEM, 1st-tier, 2nd-tier and 3rd-tier is constantly growing. The activities are increasing too. Starting from industrial services, such as operational support like IT, machinery services to peripheral industrial support like labor services and financial services, the number of companies are increasing. The assumed number of service providers in Saxony is about 300 companies.

1.3 Research and innovation

The multidisciplinary research landscape in Saxony is for more than 100 years a guarantee for new and innovative ideas in different fields of the automotive industry. In three universities, five technical universities for applied sciences, Fraunhofer-, Leibniz-, Max-

Planck- and other R&D-institutes all over Saxony are more than 50 facilities with different characteristics existing, which are dealing with problems of automobiles.
Furthermore numerous engineering companies are working on jobs for the automotive industry. A great part of this tasks, were realized in behalf of international active car manufacturers and suppliers.
The graphic below shows the general structure of research and development projects in the automotive branch. The following procedure is adopted in automotive R&D.



Quelle: AMZ- Expertise: Chancen und Risiken des Wandels zur Elektromobilität für die automobile Wertschöpfung in Sachsen

First of all the OEM does a business case to do R&D in-house or in subcontract. In case of subcontracting it is up to the OEM if subcontracting an engineering partner or 1st-tier supplier for systems and commodities. In the same way the 1st-tier supplier subcontracts – after calculating a business case – the commodity or parts.
Some institutes in Saxony are listed as R&D partner at the OEM and 1st-tier supplier. They perform direct activities. Other institutes in Saxony are covering R&D peaks, which can't be done by OEM and 1st-tier suppliers.

1.4 Main development trends in the automotive industry of Saxony

First trend is the number of models produced. Each OEM increases the number of models and time period in between models. Therefore the number of different vehicles will be higher than now.
Second, in the next years there will be an additional form of drive models developed, which are first a completion to the traditionally used gasoline- and diesel-drives but later on replaces the traditional used drives completely in some areas. Together with this the lightweight construction will be more important in the development and construction of automobiles. The scientific and economic environment in Saxony is a good base for conditions to be an important location in the fields of alternative drive models and new car concepts.

Currently there are following focal points important, to support new developments from the beginning and best possible and to make Saxony to a top-location for e-mobility and lightweight construction:

- Forming a value chain for modules for energy storages
- Forming a value chain for electric vehicles and electric drives
- An increasingly integration of lightweight construction-capacities into the value chain of vehicle construction
- Successfully implementation of e-mobility projects
- Support of new settlements of companies dealing with e-mobility and lightweight construction
- Reinforcement of e-mobility and lightweight construction as topics for (further) education and training

1.5 SWOT-analysis e-mobility of the Saxon automotive industry

Strengths of the Saxon automotive companies are into:

- metal workshops because of the high experience in this field
- competences in research and application of plastics
- electronic companies acting in the 2nd-tier level
- high networking of companies and research institutions in projects
- excellence in production equipment supplier
- R&D institutions with regional and international projects

Weaknesses of the Saxon automotive companies are into:

- Size of the companies
- Competence in production of systems and modules
- Lack of liquidity
- many extended production sites without R&D competence

Chances and risks for the Saxon automotive companies are into:

- Lightweight constructions, because of more complex cars and increasing oil prices
- New body concepts, because of the high number of models
- Traction battery, because it's one of the future technologies
- Electronic equipment for the controlling of engines and sensors
- Gearboxes

- Lack of resources
- Globalization and competition in global markets

Additional in Saxony there are general chances and risks for companies with electric mobility, which is one of the future trends in Saxony:

Chances	Risks
new organisation of the added value chain	Long R&D periods and return flow of investments insecure
Innovation in technological trends	Low investment capacities of SME, while high capabilities in global market
Excellence in R&D in Saxony	Markets are global
Excellent cooperations and networking	Small R&D capacities
	Parallel technological trends

Quelle: AMZ Sachsen

2. The Saxony Automotive Supplier Network (AMZ)

Innovations are the key element and primary objective of Saxony's Automotive Supplier Network (AMZ) activities. The network initiates and accompanies product and technological developments from the first idea to the start of serial production (SOP). As one of the largest network initiatives in the Free State of Saxony, AMZ is the strategic partner of small and mid-sized suppliers as well as the project initiator and assistant for measures designed to promote small and mid-sized enterprises in the local core branches. AMZ opens doors to new markets and assists the small and mid-sized enterprises of Saxony's automotive supply industry in the development of their human resources.
AMZ works on behalf of the Saxon State Ministry for Economic Affairs, Labor and Transport and was established in 1999 as a program of the State Ministry. It promotes measures aimed at initiating cooperation and business networks. The main focus of the initiative is to increase the competitiveness of the Saxon automotive supply industry. With the aid of product and process innovation networks, project management for series production and virtual networks, it promotes the development of continuous value-added chains and of innovative system and component suppliers. Further priorities include developing new markets and attracting automotive companies to locate in Saxony. The Saxony Economic Development Corporation (WFS) is an important partner for fulfilling these tasks. Joint efforts with other domestic and foreign supply industry initiatives as well as networks with other industries are also being forged.

2.1 Structure

The Saxony Automotive Supplier Network integrates the representatives of the business and scientific communities, regional institutions and facilities as well as governmental agencies. This permits the consolidation of resources and potentials available throughout Saxony in various committees. Partners who support AMZ are the Saxony Economic Development Corporation (WFS), which is the project partner in the project AutoNet – Transnational Automotive Network in Central Europe, and partner of the Local Team built in this project. The WFS is organizing location marketing, state information booths, and entrepreneurial trips, but also manages the acquisition of investors, business setups and international forums/conferences.

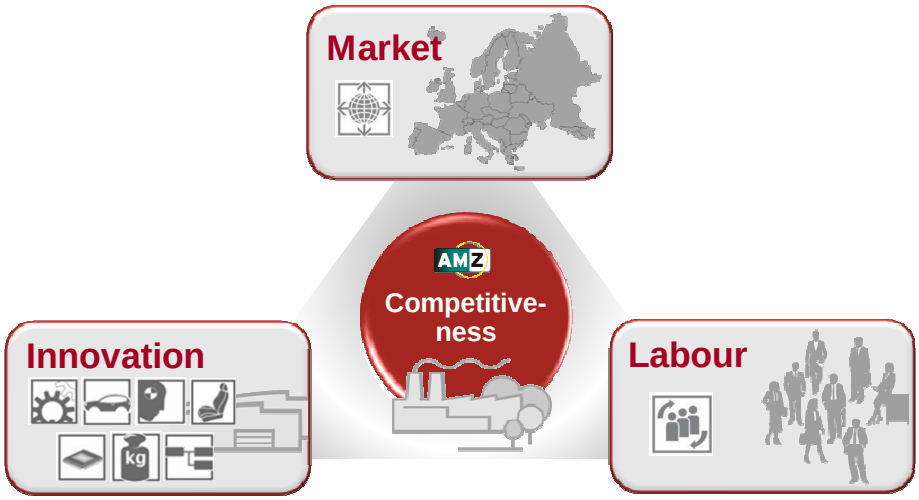
The Saxony Automotive Supplier Network is part of the Free State of Saxony's network strategy. Following the role model of AMZ, additional network initiatives were launched in Saxony's core industrial branches. Right from the start, the RKW Sachsen GmbH Dienstleistung und Beratung corporation has been the project management agency of AMZ.[2] Through the integration of both company-specific and cross-company services as well as its result-oriented network activities, RKW Sachsen GmbH actively assists Saxony's small and mid-sized enterprises within AMZ in initiating and implementing new projects along the value chain.

The initiative's advisory board acts as a consultant in the strategic organization. Conceptually, it sees itself as an industrial advisory board; in this constellation, it provides important impulses as far as the contents and substance are concerned. The advisory board also acts as a catalyst between the interests of the supply industry and the requirements of the target customers. The AMZ advisory board consists of representatives from vehicle manufacturers (OEMs), the supply industry, science, associations, contracting entities and project management agencies.

2.2 Fields of actions and activities

Since its founding in 1999, AMZ has realized substantial achievements. By the end of October 2010, the network initiative had successfully initiated and accompanied 277 technological and cooperative projects with a total participation of Saxon 1,048 companies. Main competence is the project management in application of these projects. This generates considerable potentials for the sales volume and the creation of jobs in Saxony's automotive supply industry. A potential turnover of approx. 2.75 billion EUR will be generated from cooperative and development projects in the foreseeable future. This equals a potential of 5,140 new jobs. The WFS as well as the Saxon chambers of industry and commerce are proven partners in the implementation of the tasks of AMZ.

[2] RKW Sachsen GmbH Dienstleistung und Beratung is a service provider, partner and promoter which creates individual solutions for private enterprises and public institutions. With its service portfolio which includes management, counseling, qualification and information, the company is active in the following business fields: State funded consultation – quality assurance on behalf of the Saxon State Ministry for Economic Affairs, Labor and Transport; consultation and qualification; national and international projects and networks.

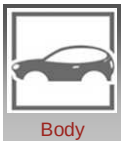


We create pre-competitive detailed conditions in order to strengthen the market position of Saxon sub-suppliers

AMZ's core competences include identifying marketable innovation potentials, developing customer-oriented projects and matching partners in industry and research together. From the initial idea to the conceptual design all the way to the launch of serial production – the network initiative always works on behalf of the network partners. These activities focus on the competence fields of Saxony's automotive supply industry which include the sectors car body, drive, interior and safety. Innovative solutions are created in combination with such other interdisciplinary fields as electronics, lightweight construction, and new technologies. The central starting point of AMZ's work is innovation:

Saxon core competences

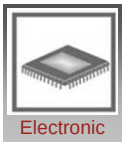

Powertrain


Body


Safety


Interieur

fields of innovation


Electronic

Lightweight


Technologies

In order to strengthen the competitiveness of Saxony's automotive supply industry, AMZ has been appointed to strategically assist commercial enterprises which are striving to become acknowledged, globally active and neutral partners providing solutions for the international automobile industry.

The automotive industry is a globally active economic branch. Internationalization is a key factor which even small and mid-sized suppliers cannot ignore if they wish to assure the sustained success of their enterprise. AMZ opens the doors to foreign markets and also

accompanies projects abroad from the initial idea all the way to mass production. They focus not only on cooperative relationships with domestic enterprises, but also on strategically important international automobile markets in close cooperation with its project partners.
A specific focus is on the emerging automobile construction regions in Central and Eastern Europe. In order to further develop the automobile region Saxony and Lower Silesia (Poland), AMZ puts the activities in Poland center stage. Through workshops, suppliers' forums, and exclusive events in the neighboring country, Saxon suppliers have established successful business relationships with vehicle manufacturers and systems suppliers operating in Poland. AMZ is acting as gate-opener to relevant foreign companies, offers automotive market analysis and participates by the support of our partner WFS at fairs. Beside that AMZ accompany political business trips of the free state of Saxony. The AMZ automotive network in Poland is outstanding. The Russian market has also increasingly moved into the focus of the strategic project work and cooperative efforts of Saxony and Russia.
For more than ten years now, AMZ has been organizing branch-specific events for Saxon suppliers as well as interested partners from the private and public sector. Their extensive experience is focused into a multifaceted series of events covering a large number of different topics. These events range from technological forums and business discussion groups to mutual events for our members all the way large congresses which address specific topics and represent important forums designed to foster the communication among small and mid-sized enterprises, universities and colleges, experts and specialists as well as the public at large. Interesting and exciting subjects are viewed and analyzed from different perspectives and provide various opportunities for intense discussions. Here is an overview about these events:

- *AMZ-Lounge:* Experts from leading automobile manufacturers and systems suppliers provide insights into the development trends of the next decade.

- *AMZ-Campus:* Saxon universities and colleges as well as research institutions present their service portfolios and describe the specific contact points where networks can be established with industry.

- *The AMZ Entrepreneurs Invite:* Members of RKW Sachsen e. V.'s Work Group "Automotive Suppliers" have the opportunity of getting to know one another and familiarizing themselves with the potentials for regional cooperation.

- *AMZ Foreign Market Special:* The opportunities and specifications for activities abroad are outlined together with company representatives from the respective target markets and other experts.

- *Saxon Evening:* Saxon suppliers meet with executives from automobile manufacturers and first tier companies located in Poland so that cross-border business relationships may be initiated in a stylish and pleasant atmosphere.

- *AMZ Profile(s):* Human resource development officers provide information on future qualification profiles for employees of the automotive supply industry.

2.3 Future hot spots

In the creation of automotive value chain, technological progress has to go hand in hand with the generation of competences. Only bright minds who think ahead can safeguard the ability to be innovative and competitive. That is why strategic human resources are and will be the cornerstone of AMZ's network (future) activities. The ProfiSACHS pilot project, which was launched in cooperation with the network initiative, is also generating solutions for the recruitment of skilled employees for the automotive supply industry and identifies opportunities for the long-term retention of qualified personnel. It is, above all, essential to attract and enthuse young people for the career opportunities available in Saxony's automotive supply industry.
By 2012, the work of AMZ will be geared towards a more precise strategy with new objectives. The key competence of the Saxon supply industry and thus, the central starting point of AMZ's work is and will be innovation. Hence, future hot spots will be the strengthening of Saxon automotive suppliers and, as explained before, the establishment of value chains for new technological needs and the e-mobility.

3. Requirements and priorities of the automotive industry in Saxony

3.1 Requirements and priorities in research and development

There are a lot of needs of the Saxony automotive branch. First of all more research and development projects together with customers are necessary, characterized by shrinking duration of an innovative technology. In future the result of a research project has to regain the invested money faster than before. Therefore research projects have to become more precise and target-oriented and the research phases have to get faster.
Due to a wider ability of different technologies and the subcontracting of R&D there is a transformation of knowledge and projects to universities and research institutions. In future we expect positive effects in Saxony, as the research landscape in Saxony is positively outstanding. The internal risk for knowledge from universities and research institutions is often characterized by being "personalized". The external risk is the high capacity in excellence of automotive knowledge in Asia.
Since the automotive industry is cutting-edge in mass production industry, knowledge should transform to other mass product branches too. Others can learn from the Saxon Automotive industry. Since the JIT concept "Production in Partnership" accelerated in Saxony, the whole VW Group transformed the concept to their production sites worldwide. Beside logistics there is as well the quality management which is excellent and can be transformed to other mass production branches.

3.2 Requirements and priorities in Saxon networking

The automotive industry in Saxony is highly linked. The automotive network is cross-linked to technologies and methods like two-component materials, software technology, micro- and nanoelectronics, mechanical engineering, logistics and others.
For connection to other branches, the Strategic networks in Saxony are working together. They are in core field's automotive, mechanical engineering, technical textiles, rail transport technology network and aviation technology network.

Within a branch the companies are well linked, to other branches the connection can be increased. The WFS combined the competences automotive, logistics and aviation within the field "mobility". Thus it creates synergies.

3.3 Requirements and priorities for Saxon automotive companies

3.3.1 Globalization

As mentioned before there are two tendencies of globalization as a new challenge: the growing market is not the home market and products become even more standardized by amount and less by individuality. For global markets the automotive companies in Saxony need more liquidity, in order to pay the growth and necessary resources. Regarding shrinking margins it will be harder to pay the growth.
Companies which are producing standardized products will have to invest globally to fulfill the needs of OEM and 1st-tier partner regarding logistic costs and have to invest in machinery parks, because with economies of scale starting from one million parts up to five million parts. Companies acting with individuality will have to invest in process optimization like set-up times and new technologies and trends.
For Saxony there are still possibilities for investments, development of existing companies and future investments of new companies, because of the outstanding R&D landscape and the transformation with OEM and 1st-tier suppliers to new products and competences.

3.3.2 Talent

Due to the demographic change the number of talents will shrink and therefore the need for talent will increase. That implies, more people need education by best possibilities and practice.
In the near future the attraction for employees will be a main indicator for a business vision and mission. Talent will become a must-have in the business philosophy. There is a strong need to regain elderly people, thus they can create value with work. Beside that women will get into a focus too, because there is a high need of women in engineering jobs. Companies with child care stations and additional offers for their workers to shrink daily activities (like fitness centers, pharmacies, …) will be in an advantageous situation to attract well-educated employees. As a result of the demographic change, the salaries will raise up in the automotive industry, as it is one of Saxony's high-tech branches and has to gain skilled employees and specialists.

Notes on the Automotive industry in Italy - Reggio Emilia Region

By Province of Reggio Emilia

CONTENTS

Regional productive system

Province of Reggio Emilia is one of the nine provinces of the Emilia-Romagna Region. Emilia-Romagna Region is considered one of the top regions in Europe. It is among the non-metropolitan regions with the highest per capita income (per capita GDP is EUR 29.670, *Eurostat font 2005*), even if in the last years, according to the national trend, the rate of growth was lower.

Significant socio-economic data concerning the Emilia-Romagna Region	
GDP as at 2007 (ISTAT)	134.905 million
GDP per inhabitant as at 2007 (ISTAT)	31.746
Export 2008	47.464 million
Export/GDP 2007	34,4%
R&D expenditures/GDP 2006	1.2%
Activity rate (average as at 2008,ISTAT)	3,2%

The industry generates 28.4% of the GDP, the service sector 67.8% and the agriculture sector 3.8%. The productive structure is characterized by small and medium size enterprises. In fact, over 400,000 enterprises in the region give evidence of a formidable entrepreneurial attitude. The region ranks 3rd in Italy after the Lombardia and Piemonte regions in absolute terms for R&D expenditure in the business sector, according to national data (*ISTAT Font*).
The business structure is dominated by SMEs, and it is important the role played by co-operative firms, especially in some clusters like agro-food, construction, retail and services.
In the last years SMEs tended to consolidate their size; medium and medium-large companies increased their importance in terms of employment and strategic role.

1. *Regional clusters*

The regional clusters reached a high level of maturity and complexity; most of them are largely autonomous and leader in their specific technology fields, thanks to the co-presence of engineering firms, knowledge services, and complementary producers around the basic sectors of the clusters.
The main clusters of the region are: *automotive, industrial machinery, agricultural machinery, engines, biomedical and precision mechanics, shipbuilding, construction, agro-food, fashion*.
World-leading brands in the automotive sector, such as Ferrari, Ducati, Lamborghini and Maserati are located in Emilia-Romagna Region and represent the best-known regional champions.

The Province of Reggio Emilia: productive system

The main specialized areas of the Province of Reggio Emilia are *automotive, industrial machinery, agricultural machinery, engines, construction, agro-food, fashion.*
The major employment impact is due to mechanical sector in automotive industry, which enhances competitiveness and innovative solutions to the traditional productive processes. The mechanical feature influences the qualified employment in automation process for industry, high quality motors, oleo-dynamic, mechatronics and precision mechanics.
The total number of companies in provincial territory is 58.092 (U*nioncamere font - 30-09-2010*) characterized by high entrepreneurial dynamism and working production; there is a good employment rate (5.0% unemployment rate at the end of 2009) and innovative production-chains with technological specialization.
Competitiveness and innovation are the result of enterprises dynamism, powerful cluster mechanisms, regional industrial policies, presence of intermediate actors in the fields of credit, training, innovation, and exports.

1. The excellence: the mechatronics

Mechatronics is the synergistic combination of Mechanical engineering, Electronic engineering, Computer engineering, Control engineering, and Systems Design engineering in order to design, and manufacture useful products. The term mechatronics is defined as a multidisciplinary engineering system design, that is to say it rejects splitting engineering into separate disciplines.
The businesses leading in mechatronics in Reggio Emilia, product components, systems and sub-systems for industry application in different sectors at international level.

Some examples: operational machinery, automatic machinery, shipbuilding, industry logistic, automotive, etc .. More requests coming from developing markets such as Brasil, China, India by big companies.

2. SWOT analysis

STRENGTH
- The companies' dynamism expressed by the importance of export sector and the finance quotation of local enterprises.
- development of technical knowledge in industrial production chain.
- internal evolution linked to the management of new project, new products on the basis of new available technology.
- continuous technological upgrading
- evolution and renewal of products
- supply of services in real time.

WEAKNESS
- SME are often small dimension
- managing department is often home-made
- lack of innovative internal services
- lack of external investment

OPPORTUNITIES
The 70% of the SME of the provincial territory realizes internally the production: this kind of management is a point of strength as well as a potential weakness. "In- house processes" mean that the structure of the company is usually vertical built especially in case of medium-sized ones and the capacity to flexibly reply to needs of clients. This also means that SMEs have perfect control of their functions, roles and possibilities and the managing staff can guarantee high quality of products comparing to international standard.
Nowadays the biggest challenge is on one hand to handle the specific request for delocalization processes and on the other hand to manage the quality of product in balance with the adaptability to global market and the local production on the territory.

THREATS
The critical signal comes from the territorial rooting: right now the new technological content of products requests specialization in realization of complex component, which might be difficult to obtain and offer.

3. *R&D and technology transfer*

All over the Region, it is registered high number of Universities and important structure of national organization for research and innovation.
The employed personnel on the field of research in the university of Reggio Emilia is 72,6%. Structures and networks are the fundamental junction for the research and the technology transfer. At regional level the law 7/2000 enhances the "promotion of the regional system of the activities in industrial research, innovation and technology transfer": this leads to the realization of the Network of Region Emilia-Romagna composed by labs and industrial research centers.

Thanks to the structured basis of research activity, the Region presents a well-connected mechanism for integration of R&D sector in business world, with rebounds on the whole supply chain, from soft to hard sector of production.
Moreover the companies receive input from the market and the consequences do impact on suppliers and sub-suppliers. This means that the competitive response of leader companies depends on integrated system of supplier.

Needs for action

At this stage there are several "external actions" which can be favorable for the field of competitiveness in mechanical engineering in Reggio Emilia.
They can be identified as it follows:

1. Keep the efforts on research, development and innovation (*external research)*

Keep the continuity between research, development and innovation means supporting companies and facing new challenges with new innovative solutions and application and transfer of technology in different production stages especially when it would be harder to provide adequate resources to the pure research. This should happen with actors of external research as third parts.

2. Mediating between internal knowledge and external know-how (*brokers and marketing)*

It would permit to companies to take advantage of the research throughout the mediation and the matchmaking between company's needs and research capability.
The core of this item is to be able to apply the pure research, on one side linking perspectives of applied actions in companies and the same in research centers; on the other side trying to get the maximum level for both actors.

3. Selecting relevant suppliers at local level (***scouting***)

The selection of relevant suppliers is the crucial matter for the competitiveness in the future. It implies to offer a service of support to identification of strong specialization at local and regional level, and it would let companies being stronger and closer to the local network, acting on the territory in direct way.

4 . Helping companies in continuous need to be updated in technology field (***technology watch***)

Considering the technology evolution one of the stronger factor of competitiveness, it is necessary to re-think to a support service stimulating the growing contamination among various application (as it is for mechatronics) and permits the access to the main technological evolutions.

5. Hypothesis of new applications (***innovation and creative solutions***)

Supporting companies in research and development activities, means creating a better condition for innovative processes as innovation in solution applied to traditional products.

Furthermore it represents the framework to understand the expressed and hidden needs of enterprises in order to identify new and further research areas.
From this perspective the role of regional and territorial actors and stakeholder is fundamental and efficient.

At the end of this list, we might say that the status of industrial district of Reggio Emilia feel the lack of the creation of conditions and foundations because the technology cluster of the mechatronic district of Reggio Emilia can make stronger its own identity as technology cluster. This kind of approach comes from the culture of R&D paying more attention to production rather than solution efficiency: a way to think and act connected to internal know-how of the company, continuous research outside, disciplines contamination, needs of sharing knowledge and experiences with other companies, entities and research actors.
This is a delicate moment when strong is the need to face the regeneration issue as from the culture side, from the basic root at territorial level, the moment when the mechanic sector in Reggio Emilia still is competitive all over the world, even if applies a re-valuation approach.

Future perspective

The future perspective in Reggio Emilia is connected to research activities of "Reggio Emilia Innovazione" and to the University of Modena and Reggio Emilia, in particular to the Faculty of Engineering. The regional network dedicated to innovation is also composed by the *Techno-pole*, which represents the real core of research and applied science of Province of Reggio Emilia.
It has established a new group of collaboration working together "Gruppo di lavoro della Meccatronica" (Working group on Mechatronic).
What companies in Reggio Emilia needs is the easier access to the knowledge and competences, as stakeholders and public bodies on the same territory. It is recognized that planned technology transfer is ongoing together with a slim acquiescence to attractive competence.
For local innovative actors one of the most specializing activities is to get in real touch with real application of research and realization of possibilities. An hard aim requiring for long-period strategy, technical approach and open-mind perspective, related to international dimension.
The finding of relevant resources to activate this solution is not always a critical point for the local system in the way it solves contrasts and manage economical crisis periods by human and work-force employment.
The long-term policies define innovation, processes and launching the "Working group on Mechatronic" make realistic the possibility to involve all local stakeholders. It is a big effort and challenge to be shared with Reggio Emilia Innovazione as it represents the local actor and fostering initiatives related to R&D in engineering, in particular in Mechatronics.
We are now in a fundamental dynamic stage leading to the "institutionalization" of the project's main idea for the location of the Working group: it is the core for economic policies, administration processes and academic actors of the provincial territory.

Internal administration and External economic policy

In terms of industrial policy, it is recognized a lack of specific competences. This fact does not permit to local bodies to have a successful and efficient system of production.

In theory the process of federalism and administrative decentralization should strengthen the local authorities in economic matter.
From this perspective, the main function of public activity is the creation of framework conditions for the development. It means to support and sustain the growing economics and qualification of SMEs through the efficient network of external economies, it is public interventions of general natural which have positive effects on policies.
Identifying the selection of those interventions it realizes as functioning the capability of facing and cooperation with the productive market and the entrepreneurship representing Association which are the organizational shape of this world.
Presenting this context, it will be reasonable to believe that "governance" could be renewed and efficient to develop and deploy.

Infrastructure

The infrastructure network constitutes a crucial point for the future of Reggio Emilia and for the whole provincial territory: at the moment it is characterized by relations and territorial sharing.
Surely Reggio Emilia is facing a wide challenge which can give an inefficient system for our area in terms of lower power of investments and attraction because of difficulties of the territory to be reached.
It is necessary then to behave in the way of a complex approach and integration strategy for the mobility of people and goods which connects the several opportunities, such as road system, railways, waterways of any kind and in future perspective also the airway.

Notes on the Automotive industry in Czech Republic

By Moravian-Silesian Automotive Cluster

MORAVSKOSLEZSKÝ AUTOMOBILOVÝ KLASTR

CONTENTS

Qualitative and quantitive analysis of Automotive Industry in Czech Republic with closer insight to Moravian-Silesian Region

1. Introduction into automotive industry in CR/MSR

AIA SAP – Automotive industry association which covers almost the whole of the automotive sector in the CR is an interest industrial grouping of the manufacturing, commercial and other companies which make up the Czech automotive and allied industries. The reason AIA was founded due to greater autonomy given after 1989, to create new organization representing the interests of the member companies, to act as the voice both at home and abroad of this important branch of the national economy and to maintain the high standards of the industry as a whole. The main aims of AIA may be summarized as follows:

- to develop the Czech automotive industry as a specific branch of the national economy
- to present the automotive industry as an integrated sector
- to promote the interests of the automotive industry in the Czech Republic and abroad in all appropriate places and at all levels
- to develop collaboration amongst its members and observers in technical, production and commercial fields
- to establish mutually advantageous contacts and cooperation with partners which are not members of AIA
- to promote cooperation between the Czech automotive industry and foreign partners

With closer insight to Moravian-Silesian Region (hereinafter "MRS") it can be determined that it belongs to the regions with a strong industry in the Czech Republic since the nineteenth century. The presence of huge deposits of coal resulted in the greatest industrial boom development of extractive industry and related industries such as metallurgy, steel and machinery production. The industry in the region employes more than one third of active workforce which create nearly half of the gross regional product.
In addition to these traditional sectors, which can be characterized as a common value chain "coal-steel-engineering" in the region, recorded a significant development outside the main industry specialization, namely the automotive, IT and electronics.

The largest employers are firms and companies operating in manufacturing industries, which employ total of **166 000 persons (29%)**, such as ArcelorMittal, Vitkovice, OKD, Hyundai Automotive, Trinecke Zelezarny, Brose, Visteon, Continental and more. More than 70,000 people employed by companies in the vehice trade.

MSR is rich in Industrial zones. They are important and promising areas with premises ready to launch investment projects. Among the most successful industrial zones out of total 20 include industrial zone in Karviná - Nové Pole, Ostrava - Hrabová and Kopřivnice where they reside the largest number of investors and localities also have optical character of thriving industrial parks. Region has prepared a strategic industrial zone Nosovice for major global car makers - **Hyundai Motor Manufacturing Czech (HMMC).** Test operation HMMC car was launched in November 2008, the ceremonial start of serial production of the Hyundai was held in April 2009.

Resulting in the **SWOT analysis** carried out under the project CERADA (Central Europe Research and Development Area) and RIS – Regional Innovation Strategy for years 2009 till 2016, MSR specifications can be sumarized as follows:

STRENGHTS

- Agglomeration economies based on spatial concentration of automotive OEM producers and suppliers
- High level of global automotive corporations' investment
- Proficiency and long traditions in steel production and processing
- Proficiency and long traditions in plastics and rubber materials
- Sound institutional infrastructure with regards to education, research & development and business environment
- Availability of "stars" – widely recognized leaders of scientific & research teams with international competence

CRITICAL FACTORS

- Poor domestic expenditure and government funding on R&D
- Moderate interest of SMEs and LMNs in innovation-related training
- Diminishing education in technical secondary education
- Absence of targeted polices for innovation support

OPPORTUNITIES

- Highest role and influence of material science on "green" technology
- Automotive production as a crucial area for application of new technologies of various nature
- Technological skills in materials related to automotive and aviation convertible to the other sectors
- Excelence centers developing – cooperation companies with univerzites

2. Products and services

Regarding the whole automotives sector there can be **three** categories defined towards the production and services: **Vehicle Manufacturers, Component suppliers and companies with special purpose orientation**

Figure 1.defines PRODUCTION AND SALES - CZECH MAKES IN January to September 2010 with specification of **Vehicle manufacturers categorization** and certain percentage in production, domestic sales and export.

Figure 1	Production	Domestic Sales	Export
PRODUCTION and SALES TOTAL:	**807 608**	**48 517**	**915 021**
January to September 2010 / January to September 2009	**+ 12,88%**	**+ 9,51%**	**+ 15,77%**
Cars (M1) + LCVs (N1)	***+ 12,99%***	***+ 10,72%***	***+ 15,84%***
Trucks (N2, N3)	***+ 18,08%***	***- 51,54%***	***+ 113,24%***
Buses (M2, M3)	***- 17,09%***	***- 28,21%***	***- 22,56%***
Motorcycles (L) under 50 cm	***- 32,20%***	***- 20,00%***	***- 44,83%***
Motorcycles (L) over 50 cm	***+ 10,08%***	***- 50,91%***	***+ 19,88%***
Trailers (O3, O4)	***- 25,08%***	***- 29,79%***	***- 41,96%***
Semitrailers (O3, O4)	***+ 17,84%***	***+ 9,36%***	***+ 12,14%***

Source: *http://www.autosap.cz/sfiles/A1-1e.htm#data10*

The **Component suppliers** base is various and touches areas as: *aluminum die casting, finishing, machining and assembly, production and distribution of exhaust systems, production and assembling of plastic car components, coolers, automotive heating and air conditions systems, door locks, central locking, brakes, shock absorbers, heaters braking, fuel and cooling systems, filtration systems and accessories, PVC plastisol putties, acrylate antivibration putties, pressed and welded parts for vehicle body and chassis, lighting systems, headlamps washers, pre-tensioners of safety belts and inflators of airbags, electronic and electromechanical parts, wiring systems, brake fluid, anti-freezers, car-care products, etc.*

As far as **special purpose organizations** are concerned, services for automotive can be describe in:

- *rescue and recovery services*
- *consulting, organizing of conferences, lecturing and educational activities*
- *assistance services for motorists, traffic informations*
- *facility management, cleaning services and supplies of chemicals and materials*
- *combustion engines research and development*
- *services for cluster members (Tier 1-3)*

Focusing on **Moravian-Silesian Rerion** there are two major OEMs – Hyundai Motor Manufacturing Czech, Tatra and high concentration of automotive suppliers on TIER 1-3 level in the production of various components, modules and systems and can be described in particular:

The dominant is in metal, plastic and eletrical-electronic components production.

- *electronics,*
- *die casting, finishing, machining, CNC maching, and assembly, pressed parts, cut and bent materials,*

- *metalworking, production tools and jigs, molds*
- *plastic parts, painted components*
- *rubber injection molded parts*

Most common modules and systems is in:
- *air conditioning and cooling systems*
- *car jags*
- *heating systems*
- *intergrated laches*
- *lighting systems,*
- *plastic systems, structure body parts*
- *pedalsystems, silencers*
- *seat adjustors, doors systems and modules*
- *steel and alloy wheels*
- *wiring harnesses*

Technologies used:
- *castings aluminum die casting,*
- *engineering CNC technology*
- *high-pressure water jet machined parts for engines and air conditioning,*
- *injection molding,*
- *powder coating*
- *soldering, brazing*
- *sheet metal forming, bending tubes and profiles, resistance and welding (arc, laser, hot plate, ultrasonic), continuous pressing, cutting tubes and sheets profiles etc.*
- *vacume metalizing*

Services in the region can be devided in two main activities with exmaples:
A) to enhance Innovation and R&D

- *approval and certification tests for all categories of road vehicles and accessories*
- *development, comparison and verification testing of vehicles and their accessories*
- *CAD, CAM, CAE*
- *computer simulations*
- *material engineering*
- *rapid prototyping*
- *restoration projects and energy solutions to waste and the environment,*
- *chemical analysis, corrosion testing, metallographic evaluation, mechanical testing*
- *scientific-research capacity, oriented on the direct application of results in metallrgy, heavy engineering, power engineering, the car and aircraft industries and IT*
- *technical diagnostics*
- *test track*

B) to develop soft skills

- *Implementation of lean and systems thinking -*
- *Leadership*

- *Innovation approach*
- *Process and project management*
- *Implementation of Invstors in People standards*

3. Markets

According to AIA SAP annual press information TI12/2010 the economic recesion influenced individual production segments with different intenzity. Personal vehicles production recorded 976 435 cars produced in 2009. Most of it has been realised by Skoda Auto, TPCA Czech and Hyunday Motor Manufacturing Czech specifically in personal vehicles segment. In overall figures the automotive production in 2009 amounts to almost 24 billion Euro (Czech statistic office 2010) which means 18,75% turnover of indusrial production in CR. Therefore CR has become 5th biggest european producer aslo 2nd biggets producer in personal vehicles segment per inhabitants in the world (95,5 cars/1000 inhabitans a year). Other segments recorded decrease in utility vehicles due to economic recesion causing less transportation usage in general.

CR automotive export in 2009 reached the amount 16,5 billion Euro representing 22,30% of total export in CR.

Automotive industry in CR employs from 140 000 to 145 000 employees.

Lates statistic published by AIA SAP TI28/2010 shows increase in personal vehicle production from January to September in 2010 by 13% compared to production in 2009

Hyundai Motor Manufacturing Czech in MSR reached 300 000 car produced on 9th November 2010since the production beginning

4. Research and innovation in region

Research and development contributes to a considerable degree of development of the Region. This is mainly due to high-quality scientific facilities in universities and other research institutions and innovative activities of private companies operating in the region. Increasingly important factor in the development of innovative business in the region are becoming institutions like business incubators and technology parks, and in particular support mechanisms, including Grant Aid Programme of research and development in the Region 2010 and Regional Innovation Strategy for the Region for 2009 – 2016. The aim of regional innovation strategy is to support comprehensive research, development and innovation activities through specific projects in the areas of technology transfer, human resource development and internationalization.

Outside the main specialty of the region are also successfully developed a progressive research directions to address the sophisticated requirements of the current application domain. In this context, for instance by providing research and development of **new materials, lighting systems, air conditioning and cooling systems for automotive industry,** development of information technologies, such as special software-related consulting and system integration, development of special equipment for power (often based on energy use waste), development of special (measuring) equipment for the metallurgical, mining, engineering and new innovative methods in the specialized field of engineering (especially) for heavy engineering. The development of research and development activities also occur **in areas of industrial automation, robotics, electronics** and chemical industries.

5. Mapping of excellence within the region

Manufactures and R&D capacities – "Champions"

Brano Group, one of the significant TIER 1 supplier in cockpit and door systems, commercial vehicles, platics, lifting devices and door looks.

Brose Group, is a partner to the international automobile industry and deliver our mechatronic systems and electric drives to more than 40 automakers as well as suppliers.

Continental Automotive Systems Czech Republic is one of the world's leading automotive industry suppliers of tires, brake control systems, driving dynamics control, driver assistance systems, sensors, systems and components for the powertrain and chassis, instrumentation, infotainment solutions, vehicle electronics and technical elastomers contributing towards enhanced driving safety and protection of the global climate

Cromodora Wheels has been one of the first producers of forged and cast magnesium alloy wheels for competition use as well as being the technological innovator in the process of low pressure casting heat treated aluminum alloy.

CTS Corporation is an innovative designer and manufacturer of sensors and actuators, electronic components, and a leading provider of value-added electronics manufacturing services (EMS).

Visteon-Autopal, **Ltd.,** is a center of world development and manufacture of lighting, air conditioning and refrigeration equipment, molds and tools for the automotive industry (in particular, air hoses, accumulators, condensers and heat exchangers for various heat exchangers for different systems).

IPG, Ltd., has currently 21 modern injection molding machines with clamping forces of 35-500 tons.

United Polymers, Ltd., produces rubber and plastic components incorporated in the various assemblies – searchlights, tail lamps, interior illumination, pedals, console, arm support, air condition, cooler, engine starters, fuel system, screen washing, etc.

Smartplast, Ltd., offers processing of plastics, injection plastic parts design and construction of injection molds.

Hyundai Motor Manufacturing Czech is the OEM manufacturer

Tatra, a.s. is currently supporting the production program of heavy-duty off-road vehicles and vehicles for combined transport-road terrain that constantly improves and evolves.

6. Moravian-Silesian Automotive Cluster intentions

are to provide services, to prepare projects, to collect and manage resources and to promotte public awareness following the Cluster mission, in particular to:

- create conditions to fully utilize synergies of production and development potentials in automotive and downstream industries,
- encouraged and promote innovation and competitiveness in fields of economic activities,
- promote communication between entrepreneurial, public and nonprofit organizations that have related interests,
- contribute to successful development and social programs implementation of the Cluster,

- optimize sectoral structure of trade-industrial relations and professional orientation within the Cluster, with the focus on automotive and related sectors of the MSR territory,
- organize and carry out consultancy and training for its members and public based on non-profit activities, including seminars and educational events focusing on the cluster issues and issues related to the automotive and human resource development within
- create an environment for successful business, for balance between development and production capacieties within region

Needs and priorities

Coming out of MSAC intentions agreed within Cluster members during General meeting result is in executing continuous activities regarding joint cooperation specifically in support of:

A. Human resource development
B. Supply chain
C. Research and laboratories testing
D. Other activities

Ad. A) The very end result is to create "educational chain" that would link educational curriculum with businesses needs. In other words, is to educate people from interrelating organizations like technical high schools, through universities level up to the organizations themselves.

At vocational and training schools as well as at the university level this will develop students' key competences to simplify their integration and adoption into the working process. It will strengthen the employability of graduates and strengthen the consequently competitiveness of the automotive companies as well. The modules creation is based on top professional practical requests of people with long-term experience in the field. The training in organizations would be based on internal lector training who will simultaneously apply the knowledge into business functioning processes under the expert supervision.

The success story can be referred to project AutoAcademy for high schools in creation of educational materials in key areas:

- **Lean production processes**
- **Project management**
- **Logistic**
- **Leadership**
- **Innovations**

This has been the first step up of the human development in educational chain "staircase"

Ad. B) According to the results carried out under Ernst&Young research focused on Supplier chain management, the one of the crucial factors are cost reduction pressures in automotive and liquidity in shorter period of time. Therefore the Joint purchase project stands as a priority. First results in oil purchase have showed us the significant space to

generate savings. To profound the idea and whole impact, MSAC intends to expand and improve membership base in order to fasten innovation processes.

Other important role is:

- to profound cooperation between TIER 1 and suppliers via supply chain supporting and allowing companies find easier way to make business. Take advantage of synergies to streamline business operations.
- to develop cooperation in areas of mutual interest via matchmaking events and exchange of experience seminars
- to deepen mutual understanding and cooperation in specific identified areas within the supplier customer relationship

Ad. C) In order to utilize "R&D and Laboratories testing chain" the aim is to bring more companies together that would benefit from available capacities universities and other research organizations offer. Consequently there is importance to improve universities R&D potential awareness and Cluster available laboratories promotion. This chain would be tool to gather specific group of experts with specific tasks to solve. To support the idea prepared PIM project (Powder injection molding) is an example of mentioned effort

Ad. D) Prepared other acctivities appriciated by members lead in areas of:

- **Ergonomic laboratory** construction as a reflection of human aging foresights. The aim is to start building the ergonomic laboratory / instrumental part of the knowledge / in support of cluster members to build new and edit existing sites leading to the elimination of occupational diseases and enhancing work cultivation
- **Knowledge house** (in Industrial engineering, robotics, injection molding) the whole idea is to increase the awareness to know where to ask for the help.

Notes on the Automotive industry in Poland- Lower Silesian Region

By Lower Silesian Agency for Economic Cooperation

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Analysis of the Automotive Industry in Poland

Analysis of the Automotive Industry in Poland

Introduction

The Polish automotive industry only really took off after World War II. Just a few thousand vehicles had been registered in Poland in 1914. While this number grew to 40,000 during the interwar period, there were far more trucks than passenger vehicles on Polish roads on the eve of World War II in 1939. The turning point came when Soviet-licensed family car, the Warszawa , was launched in Warsaw. Production and sales were still relatively modest prior to the economic and social reforms that followed the fall of the communist regime in 1989. Since then, several international automotive concerns including Volkswagen, General Motors, Fiat, MAN and Daewoo have set up shop in Poland as part of their Central and Eastern European strategies.

The automotive industry is one of the Polish economy's major driving forces. It posted a record result in 1999 producing 740,000 commercial and passenger vehicles and achieving sales of 640,000 units. The industry's situation later deteriorated on account of several factors including the global economic downturn, frequent amendments to taxation legislation, the lifting of sales restrictions following Poland's accession to the EU, and a declaration in the increasing affluence in polish society. This was reflected in poorer financial result and falling employment.

Fiat, VW and GM began unveiling new models in 2003 in order to break the trend. The immediate prospects for manufactures and their suppliers are quite upbeat even though the recent drop in new car sales is comparable to that early 1990s.

The mayor players in Poland's automotive industry are manufacturers of commercial and passenger vehicles (Fiat Auto Poland , GM, VW Poznań, FSO and Intrall) and buses (Autosan, Volvo Polska, Solaris Bus and Coach, Scania Production Słupsk, MAN Star truck and buses, Solbus, Jelcz, Kapena and AMZ Kutno) . MAN Nutzfahrzeuge will be joining the group when it opens Poland's only heavy truck manufacturing plant in Niepołomice near Kraków sometime around the end of third quarter and the beginning of fourth quarter this year.

Increased investment has brought the industry out of its slump with production rising 133 % from 300,000 units in 2002 to 700,000 in 2006.

Overview of the Automotive Parts Industry

The parts and components segment is playing an increasingly important role in the Polish automotive industry. Automotive suppliers employ more than 108,500 people accounting for as much as 81 per cent of the total employment within the motor vehicle industry. In 2007, more than half of the export of the local automotive manufacturing was covered by parts and components and equaled to €8.2 billion. This positions Poland as the leader among the new EU member states. The major recipients of export production are Germany and Italy, together accounting for as much as 45 per cent of the total volume of the parts and components sent abroad. This is largely the case because three out of the four largest car manufacturers in Poland originate from these two countries.

Already nine out of the top ten global automotive suppliers have their manufacturing plants in Poland. The business case behind establishing their presence in the country is a combination of at least three major factors:

- Geographical proximity to key customers and target markets
- Cost-quality advantage and favorable investment conditions
- EU membership

Initially, many automotive suppliers entered Poland following earlier investments of vehicle manufacturers (VMs). The large manufacturing plants of Opel, Fiat and Volkswagen attracted a number of their subcontractors to Poland. Further inflow of new contracts came in 2007 and in the first half of 2008 following Kia and Hyundai's investments in the Czech Republic and Slovakia. The regions of southern Poland, the Czech Republic, Slovakia and Hungary are evolving into a large automotive cluster, and are already being referred to as the "new Detroit". Thus, establishing manufacturing operations in Poland means prospective growth opportunities, as the importance of this CEE region is likely to increase in the future.

Parts and components from Poland gained international recognition as quality products, and between 2002 and 2007 their export grew at a CAGR of more than 27 per cent. Local manufacturing largely concentrates on key and complex systems, and not merely on basic subcomponent and accessories. The parts being manufactured and exported include bodies, shock absorbers, steering systems, safety systems, transmission systems, electrical equipment and axles. The major area of focus in Poland are engines, which accounted for 13 per cent of the automotive export in 2007. With Toyota, Volkswagen and Fiat engine plants, Poland is the largest regional participant in this field, and the fifth-largest global exporter of diesel engines. Next to large foreign manufacturers present Poland, there is a number firmly established local players. Inter Groclin Auto is an example of a successful company that produces the automotive furniture supplied to Renault, Mitsubishi and many highly quality-oriented German manufacturers such as Volkswagen, Mercedes and Audi. In 2006, Groclin signed a contract worth 445 million PLN for the delivery of furniture for Volvo cars.

Finally, companies indirectly related to the automotive industry also established their manufacturing sites in Poland. Leading international tire manufacturers such as Goodyear, Michelin and Bridgestone have plants in Poland, and exported products worth €1.2 billion in

2007. Moreover, major glass producers such as Pilkington Automotive and Saint-Gobain Glass invested in manufacturing in Poland.

The presence of a large number of companies from the automotive and related sectors is a significant indicator of the attractiveness of Poland as a manufacturing destination. The parts, components and accessories produced locally are being supplied to most of the global car manufacturers, including Mercedes, Nissan, Opel, Toyota, Volkswagen, Isuzu, Fiat, Citroen, Honda, Peugeot, Volvo and BMW, as well as to the top luxury brands such as Rolls-Royce, Lamborghini, Ferrari and Porsche.

Historically cars produced in Poland (covered period after WWII)

Passenger Cars Factory ***- Fabryka Samochodów Osobowych FSO***

- 1940's - 2000: numerous licensed compact/middleclass models. Last own design production ceased '2000ction
- 1990's – South Korean Corporation cooperation/takeover. Initially CKD/SKD assembly, later manufacturing process of mainstream small/ compact/ middleclass models
- late 2000's – currently: state/private Polish/Ukrainian/American, manufacturing the small / compact mainstream models.

Small-capacity Cars Factory ***- Fabryka Samochodów Małolitrażowych FSM***

- 1970's-1980's – own design full frame 2-stroke engine compact car. Commercial variations also manufactured.
- 1970's-2000' – popular supermini car based on Italian license design.
- 1990's until now – privatisation, italian ownership. High volume mainstream/premium supermini cars.

Busses

Autosan

- 1950's – now: wide range of full size busses & coaches. Since 1990's graduate decrease in production.se in production.

Jelcz

- 1950's early 2000's: wide range of full size busses & coaches, early models under French license.
- 1950's early 1980's: middle range coaches.

Vans

Commercial Vans Factory ***- Fabryka Samochodów Ciężarowych FSC***

- 1940's – late 90's: own full frame design RWD vans, light flatbed trucks, multipurpose & special vehicles. Mostly PI powered. Since late 80's also equipped with domestic supplier CI engines (engine still in limited production until now, Euro-5 CR version available).

- 1980's until now – own design 4WD light off-road vehicle. Mostly military/municipal use.
- 1990's until now: switching ownership, heavy struggle to keep up with the market demands. In private hands now. Very limited activity based on left resources.

Agricultural Vehicles Factory - ***Fabryka Samochodów Rolniczych FSR t***ory

- 1960's – 1990's: own design ascetic rural light vans/flatbed trucks with FSO/FSC powertrain.

Trucks

Trucks Factory STAR -***Fabryka Samochodów Ciężarowych STAR*** STAR

- 1950's-early 2000's– popular middle tonnage trucks/chassis/bodies to cover the country's economy/military/municipal demands for the local/middle range transport.
- 2000's – privatization: well-established German brand. Continue the manufacturing process of German design trucks under both brands. Currently the manufacturing process moved to the new factory. ew

Trucks Factory JELCZ ***- Fabryka Samochodów Ciężarowych JELCZ***

- 1950's-early 2000's– popular high tonnage trucks/tractors/chassis/bodies to cover the country's economy/military/municipal demands for the middle/long range transport. Production gradually decreasing since 1990's. Currently very limited production for the military purposes only.

Review of automotive sector in Lower Silesia Region

In recent years Lower Silesia has been a veritable hotbed of economic activity. Its capital, Wrocław, has earned the respect of international investors and become the envy of other city authorities in Poland by attracting major foreign investment. Other cities in the region too have attracted sizable investment. The voivodship's well-educated, adaptable labor force – together with helpful local authorities – has helped lure firms from the high-tech sector. Indeed, the region hosts around a third of the companies operating in the Polish IT market. An abundance of engineers has also fueled the development of the white goods sector and the automotive industry. For example, Toyota has factories in Wałbrzych and Jelcz-Laskowice, Volkswagen in Polkowice and Volvo in Wrocław. Świdnica, meanwhile, is home to factories owned by whitegoods producers Electrolux and Nifco. Lower Silesia has long been home to significant mining activity and it hosts the administrative seat of KGHM, one of the largest copper and silver producers in the world. City and regional authorities offer investors administrative assistance, tax breaks and support in the form of government and EU grants. In addition, no fewer than four special economic zones have subzones located in Lower Silesia. Lower Silesia borders both the Czech Republic and Germany, which has helped it to become one of the biggest exporters in Poland. Its top exports include machinery and electrical devices, non-ferrous metal materials, automotive vehicles and furniture. The region is strategically located on the Oder River in the southwest of Poland, and is bisected

by the A4 highway, which facilitates transport between Germany and eastern Poland. The continual development of road and broadband-internet infrastructure, as well as the development of a commuter railroad and rapid trams, will contribute to future growth.

Biggest companies:

RONAL POLAND (www.ronal.com.pl), Toyota Motor Manufacturing Poland (www.toyota.com.pl), FAURECIA - Wałbrzych Sp. z o. o. (www.faurecia.com.pl), Metzeler HOSE AUTOMOTIVE SYSTEMS. z o. o. (Www.metzelerautomotivehs.getin.pl) TAKATA - PETRI Sp. z o. o.(Www.takata.com), Grossmann POLAND Sp. Ltd., Volkswagen Motor Poland(www.volkswagen.pl), GKN Automotive (www.gkn.com), Nastech, Gates(www.gates.com), Volvo (www.volvo.com), Bosch (www.bosch. com), WABCO (www.wabco.pl), Autoliv AB (www.autoliv.com), Yagi, NSK Steering Systems (www.nsk.com.pl), SANDEN (http://sandensmp.pl), Vorwerk Dichtungssysteme GmbH (www.vorwerk-vds.de), Antolin (www.grupoantolin.es), Industriale Sud (www.gmisud.it),Remy Automotive (www.remyinc.com), Vectrix (www.vectrixusa.com).

Industry Overview

Lower Silesia as a region with strong industrial tradition, exist in Poland and is likely to occur in Central Europe as an automotive cluster, which core is many Polish companies and a large number of already existing foreign investors. A very wide base of suppliers with the right promotion is one of the most important factors in attracting other foreign direct investments to the Region, especially large and well-known car manufacturers.

A long tradition in the manufacture of buses has Car Factory Jelcz, which are also producing MAN engines. In Wroclaw, in the 90's Volvo built a truck assembly and a bus factory. Also in Wroclaw WABCO company has build from the ground braking systems factory. For several years Volksvagen manufactures engines in the factory in Polkowice. Toyota also produce gearboxes Żarów near Walbrzych and Wałbrzych. In the production of motor vehicles are employed in Lower Silesia, over 12 thousand employees.

SWOT analysis :

Strengths
- three Special Economic Zones; the Wałbrzych SEZ particularly focused on the automotive industry
- traditions of automobiles in the region (Jelcz factory)
- large number of automotive companies
- many suppliers to the automotive industry
- high investment attractiveness of the region
- University of Technology (one of the biggest in Poland) with Faculty of Mechanical Engineering as a source of skilled staff
- European transport corridors (no. III)
- large investment in technical infrastructure
- well-developed transport infrastructure (roads and railway system)

Weaknesses
- no car assembly
- bad habits and lack of trained staff with experience in the automotive industry
- lack of experience in connecting to the companies network
- insufficient cross-border exchange of experiences
- large number of small businesses experiencing economic difficulties
- slow pace of innovation in enterprises
- insufficient knowledge of the investing advantages among potential foreign investors
- structural unemployment resulting in shortages of skilled workers
- no ring road causing difficulties in transportation in the region (one is being developed)

Opportunities
- formation of car assembly factory in the region
- development of special economic zones
- financial support for the border subregions of EU funds
- growth in Japanese economy
- easier business entrance into new markets in neighboring countries (because of the proximity of the borders)

Threats
- winning investments by neighbors from the Czech Republic and Slovakia
- existence of Special Economic Zones to 2020
- competition from companies in neighboring countries
- emigration of highly skilled workers to other EU countries
- inadequate budgetary allocations for the development of science

Market Restraints and Risks

The automotive sector in Poland also faces certain restraints that could have a negative impact on future growth. The major ones that need to be taken into the account are as follows:

- **Unfavorable labour market conditions:** Increasing labour costs along with workforce shortages and difficulties with employee retention constitute a significant impediment for companies already present in Poland and for potential new investors. The relative impact of this factor might be lower as in the neighboring Slovakia and Czech Republic employers are experiencing similar problems.

- **High fuel prices:** Continuous increases in the costs of petrol in the first half of 2008 caused many transport companies to cancel their orders for new vehicles, and even? Led some to bankruptcy. This means a temporary decrease in new truck sales, which are mostly purchased by carriers. Till date, the passenger cars segment seems to be less affected by this restraint, as its sales grew by more than 16 per cent during the same period30. If petroleum prices continue to increase, the impact of this restraint will be most visible in the sales side of commercial vehicles.

- **Strong Polish Złoty:** The appreciation of the PLN to the Euro is affecting the overall profitability of companies whose production is oriented with exporting goods to the

Euro area. If the PLN-Euro exchange rate remains high, it could adversely influence the choice of Poland as a cost-effective manufacturing location.

- **Import of second-hand cars:** Large volumes of imported used vehicles led to a significant decrease in the sales of new cars, and lowered the profitability of car dealers. The impact of this restraint is likely to decrease gradually over time, and signs of the same were noticed in 2007 and in the first half of 2008, when sales increased again after a significant downturn in 2005 and 2006.

Investment opportunities in the Polish Automotive Sector

Poland is one of the most attractive countries globally, for foreign direct investments. With a combination of advantages such as an efficient labour force, government and EU incentives, geographical proximity to key western markets with transport routes in place, a booming economy and rapidly developing market, Poland can offer a strong value proposition to make a business case happen.
According to an Ernst & Young survey from 2008, Poland is considered to be the best location in Europe for new foreign investments and expansion [3]. The ranking is not only based on hard criteria, but also on perspectives and expectations regarding future development. Additionally, according to an A.T. Kearney FDI Confidence Index, Poland is ranked among to the top 25 countries (globally) with the highest position in the CEE region. Below there is presented list of the major opportunities and benefits that investors can leverage in Poland :

- **Geographical proximity to western European and CIS markets with good infrastructural connection :** Poland is located next to Germany – Europe's largest car manufacturer and consumer market for cars. Most of the existing plants and facilities are located in the Western (Wielkopolskie), Southern (Silesia) and South – Western (Lower Silesia) regions of the country – all with good road, highway, railway and air connections in place.

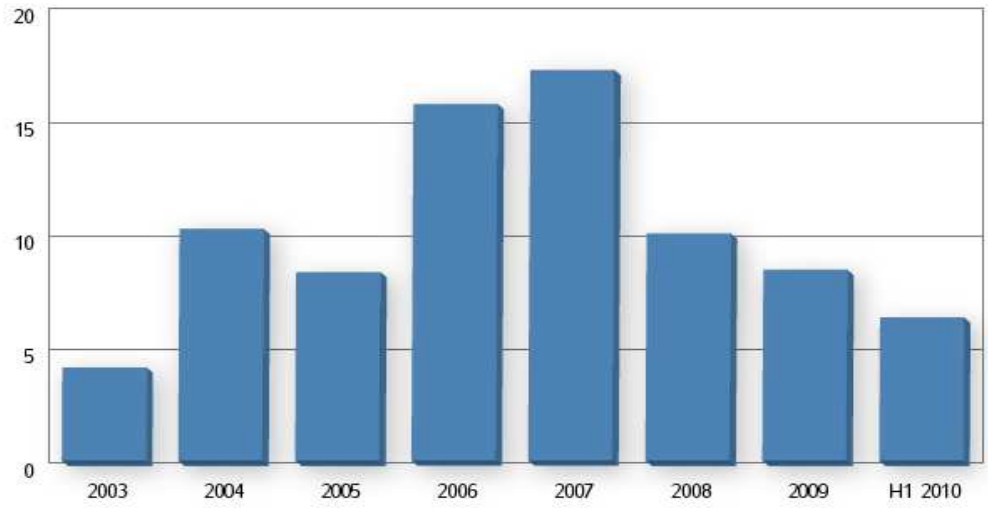
[3] Ernst & Young, 2008

MAIN EXPORTS MARKETS IN 2009		
COUNTRY	€ MILLIONS	IN %
Germany	25,685.7	26.1
France	6,826.2	6.9
Italy	6,740.6	6.9
UK	6,300.1	6.4
Czech Rep	5,745.4	5.8
Netherlands	4,175.0	4.2
Russia	3,595.5	3.7
Hungary	2,654.8	2.7
Sweden	2,636.4	2.7
Spain	2,577.6	2.6
SOURCE: CENTRAL STATISTICAL OFFICE		

- **Efficient labour force :** Poland has one of the most efficient labour forces in the CEE region, with the productivity-adjusted labour cost almost twice as low as the EU-25 average. According to a rating of the Federation of European Employers (FedEE), in 2007, Poland was ranked as the most attractive country for investment from a human resource perspective. Each country's assessment included a combination of criterion such as labour supply, human capital, employee relations, labour cost, labour flexibility and inflationary pressures. Poland was able to move up six positions in comparison to 2006, outperforming all the other EU countries.

- **Incentives for foreign investors :** Foreign investors can enjoy a number of incentives in Poland, including CIT exemption, real estate tax exemption, cash grants and technological loans. Companies can simultaneously benefit from several incentives when establishing their operations in one of the 14 Special Economic Zones (SEZ) located all over the country.

FDI inflow to Poland in € billions, 2003 to June 2010



- **Favorable tax regime :** Poland offers an tax system for investors from the automotive industry. CIT is at 19 per cent, so significantly below the EU-15 average (29 per cent), with lower or competitive level to the majority of the countries in its region.

- **Development of regional clusters :** Poland is actively developing regional clusters where enterprises can effectively leverage the effect of synergy. Automotive production sites are grouped around the four major agglomerations of Warszawa, Wroclaw, Katowice and Poznan. Additionally, Poland is mentioned in the context of regional automotive cluster comprising the Czech Republic, Slovakia and Hungary. Many suppliers have already leveraged this opportunity by establishing production sites in Poland, with the target recipients being in Slovakia.

- **Large human potential :** Of all new EU countries, Poland has the largest pool of human resources available, with world-class engineers. In 2007, there were 1.94 million students in Poland , and the ratio of people studying to the total population (5.1 per cent) was higher than of Hungary, the Czech Republic and Slovakia (4.2 per cent, 3.1 per cent and 3.2 per cent , respectively). Investors also have the largest academic base at their disposal, with more than 315,000 students in technical faculties alone, 39 schools with a Mechanics and machine Building faculty and 22 schools with a Transportation faculty.

- **Availability of EU funds :** The availability of EU funds not only means subsidizing infrastructure modernization of vast regional development plans, but also financial assistance for smaller initiatives and single companies. Within the framework of various programmers , enterprises can also apply for R&D support grants, environmental support grants as well as several educational and training funds. After joining the EU in 2004, all new member countries received significant financial support in the form of structural and cohesion funds. Many smaller states including Hungary, Slovakia and the Czech Republic, which also acceded to the EU in 2004,

benefited, and were able to increase their GDP and income per capita levels. As a result, their available portion of cohesion funds to be used as FDI incentives from 2007 to 2013 decreased. However, Poland will continue to obtain considerable subsidies, and will be able to offer more to potential investors than neighbor countries.

- **Presence of large vehicle manufacturers and leading suppliers :** Poland is one of the leading manufacturing sites in the CEE region, with Fiat, Opel and Volkswagen having their production plants in place. Further, a number international suppliers are producing their components in Poland, including Bosch, Delphi, Denso, Faurecia, Johnson Controls, Lear, Magna, VDO, ThyssenKrupp Automotive, Toyota Boshouku, TRW, Valeo and Visteon. At present, there are more than 700 subcontractors in the automotive space, of which over 45 per cent hold the highest quality certificates.

- **Booming economy and rapidly developing consumer market :** The sale of new passenger cars reached 300,000 in middle of 2008. According to the Polish Automotive Industry Association (PZPM), the number of units sold is far below the level of market saturation assessing the potential of the Polish passenger car market as being at least three times as large.

Future Prospects for the Sector

- The Polish automotive sector seems to offer promising prospects for the future development. Growth opportunities lie in the supply as well as the demand side of the sector.

- Poland will continue to attract FDI in the automotive sector. In 2008, PAIiIZ (Polish Information and foreign Investment Agency) finalized new investments in the automotive manufacturing space, of which the largest is a joint venture of Bosh and Denso named Advanced Diesel Particulate filters near Wrocław.

- A further increase in the volumes of motor vehicles manufactured is expected. This will be fuelled by launching the production of new models and expanding the production of existing ones. New foreign investors will establish their production plants in Poland, significantly contributing to the overall vehicle output. The country will not only continue to export vehicles to traditional markets such as Germany, but will also be an exporter to the fast developing car markets of Russia and CIS.

- Poland holds considerable potential as an end market for vehicle sales. Taking into the account the relatively low level of market saturation it is clear that there still is vast potential to increase the sales of new cars. In the long term, as Poland will become more affluent and increase its purchasing power, at least some of the demand currently covered by second- hand cars will be replaced by new sales.

- Having the largest labour force in the CEE region, Poland has immense potential to become a regional BPO hub in the future. This is especially significant, as along with the growing economy, the gap between labour costs in Poland and western Europe will decrease, thus forcing international vehicle manufacturers to relocate their

production further east. The ability to offer advantages other than cost will be a crucial determinant of competitiveness in the region.

- Growth potential also lies with automotive clusters. The existence of local clusters in voivodships Wielkopolskie, Wielkopolskie, Śląskie and Dolnośląskie will attract more companies to invest in the region. Poland is already benefiting from the development of regional clusters. Major investments by vehicle manufacturers in Slovakia and Czech Republic have already attracted a number of suppliers.

- Market growth over the period 2009-2013 will not only be driven by strong economic growth and the inflow of FDI, but also by mid-term drivers that are to likely to generate an additional push namely the Euro 2012 and the financial aid from EU funds. Strict deadlines related to the organization of Euro 2012 and large financial endorsements will result in Poland modernizing and expanding its transportation infrastructure and airports, and even building new hotels. This in turn will have a direct influence on the overall attractiveness of Poland, and translate into new FDI.

Notes on the Automotive industry in Poland- South East Region

By Podkarpacka Izba Gospodarcza

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Quantitative and Qualitative Analysis of the Automotive Industry in Poland

1. Introduction and the main features of the automotive industry in Poland

The first Polish cars were built in the Central Motor Workshop. Cars CWS and CWS-T Tadeusz Tański were not mass-produced. In 1926, the Ursus factory which produced int engines mainly for farming, bought a truck license Italian SPA and started producing a truck nar Since 1930 Ursus became part of the state engineering factory that produced cars and trucks un company Fiat. Using their teams performed many varieties of derivatives, including 20 - the years 1935-1939 was developed, many Polish construction such as: a prototype of a large lorry of car engines 403 and 705, motorcycles Falcon 200, Falcon 600, M-111 and others. In 1939 s plants which would produce 10 000 trucks per year. The entire plant was destroyed during the

After the war the Polish automotive industry had to start from scratch . In 1946 it was decided to start a truck with a load capacity 3.5 tons, named the 20th Star In 1948 in Starachowice produced the first 10 cars. However, regular production began in 1949, three years later in a newly built factory in Warsaw Automobile series of trials were assembled FSO Warszawa, whose design was based on Soviet license. Also under the terms of the Soviet in the same year Poland started producing 2.5-ton trucks FSC Lublin. Common features of these cars was an outdated design, and political issues decided by the selection of the licenser.

In later years were established new factory such as: Sanok Bus Factory, Jelczańskie Car Factory, Commercial Vehicle Factory in Nysa, Mechanisms of Car Factory in Szczecin and many others. Former Star 20 replaced successively 21, 25, 27, 28 and 29, Star 200, 1142 and Star 742nd

Buses San Jelcz and Sanok, cars, heavy duty A80, Jelcz 315, a popular car a mermaid stages of development of our automotive industry. Each of these vehicles was performed in different variations and gradually modernized. Great importance for the Polish automotive industry was the purchasing in 1965 in Italy a car license bearing the name of our Polish Fiat 125p. Purchase of this license, together with modern technology and documentation resulted in the modernization of machinery park in Warsaw FSO, but also a number of cooperating with her small production facility.

In 1971 he signed a license agreement with Fiat to produce plants Polish Fiat 126p car

in newly built factories in Bielsko and Tychy. For many years, they were very popular cars on Polish roads. They stopped produce it in 2000. In the years 1971-1976 was launched assembly of other cars of this company. The Car Factory in Bielsko-Biala assembled for some time, Polish Fiats 127p, and FSO in Warsaw-Fiat 128p, 131p and 132p.

The next stage of development, FSO has become a launch in 1978, passenger car production, called the Polonaise. Their production proceeded in parallel to produce Polish Fiat 125p. These cars were indeed many common bands. In the seventies, the development of the automotive industry is not spared by trucks and buses. In 1972 an agreement with French company Berliet on cooperation in the production of high capacity buses. In the Bus Factory launched first assembly of buses Jelcz-Berliet PR 100, and then Jelcz-Berliet PR 110th. In addition to cooperation with the French company Berliet, Jelczańskie Car Factory established contact with the Austrian company Steyr, co-operating on the family of heavy-duty vehicles. In Antoninek near Poznan was a car factory farming Tarpan. The trucks factory in Lublin, work began on production vehicles.

In the eighties, the development of the automotive industry has been considerably curtailed. This was due to the problems experienced in the country's economy. Suspended implementation of certain investments, reduced level of production of individual plants. In the last decade of the last century there has been a revival in the automotive industry. Poland has become an important market and a stronger player, with a highly qualified and relative cheap labor.

Significant investments made in Poland concerns Fiat, Daewoo and General Motors. The resulting plants assembling cars, Ford, Volkswagen, Mercedes.

According to the SWOT analyses, the main features of the automotive industry are listed as follows

Strenghts

- Strategic location
- Low labor costs
- Quite well-developed automotive sector
- The location of the cluster in the region of air (aviation valley)
- The existence of Special Economic Zone
- Large number of technical universities

Weaknesses

- Bureaucracy,
- Low resources for R & D,
- Poor road infrastructure,
- Old-fashioned system of education,
- Lack of state aid for the automotive industry

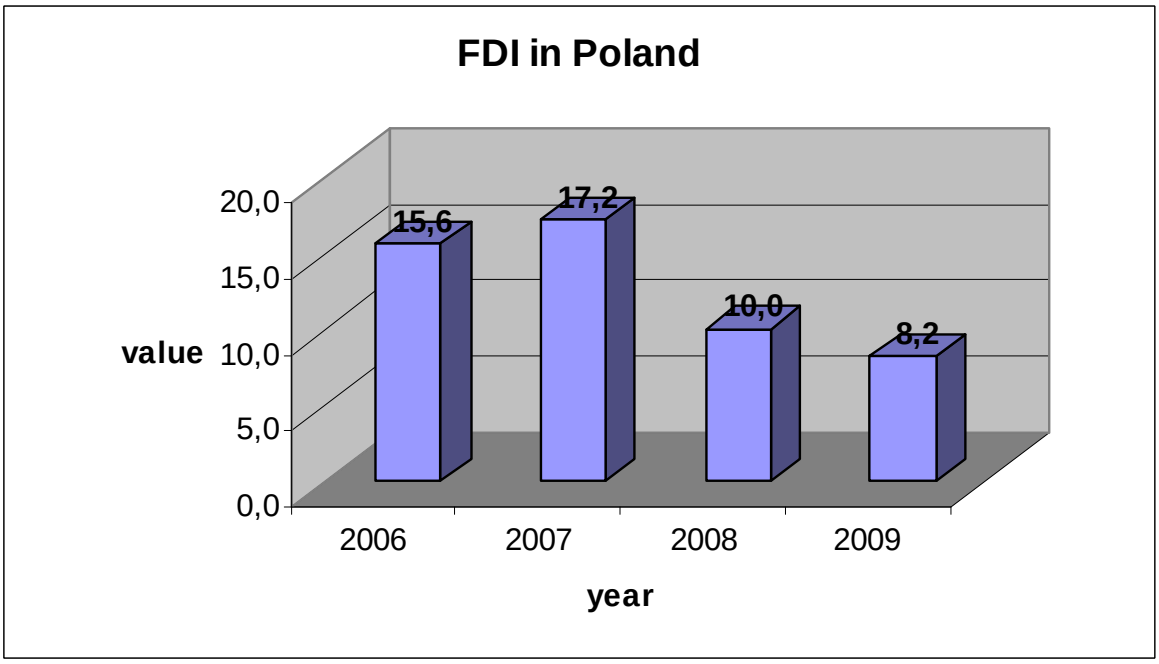
Opportunities

- Possible accession Ukraine to the EU
- Ending the crisis
- New opportunities in cooperation with foreign companies in development for example of green cars

Threats
- Chance to move automotive sector to China and East Europe
- Increasing labor costs
- Outflow of professionals abroad

2. Structure of the automotive industry in Poland

For many years, Poland is one of the largest recipients of foreign direct investment (FDI) in Central and Eastern Europe. To Poland went nearly one-third of all foreign investments carried out in the region. However, it can be noted that the volume of FDI in Poland in recent years has varied what shows chart below.



Among the foreign investments which have been poured into the Poland after 1989, the outstanding role played by investment automobiles. The inflow of foreign capital in the automotive industry till 2008 was quite stable and ranged from 300-700 million annually. There was a record was in 2003 and 2004. Then the investment be executed on the Polish market of Volkswagen and Fiat, have seen the inflow of foreign capital with a value of 684.2 and 757.9 respectively million. 2005-2007 years should also be regarded as successful. In 2006 invested in the Polish automotive 466.6 million, while in 2007 this sum rose to 680.8 million. Overall, in 1998-2007, the total foreign investment in the Polish automotive sector amounted to 4.35 billion euros, representing 4.9% of foreign investments that have been poured into the Polish.

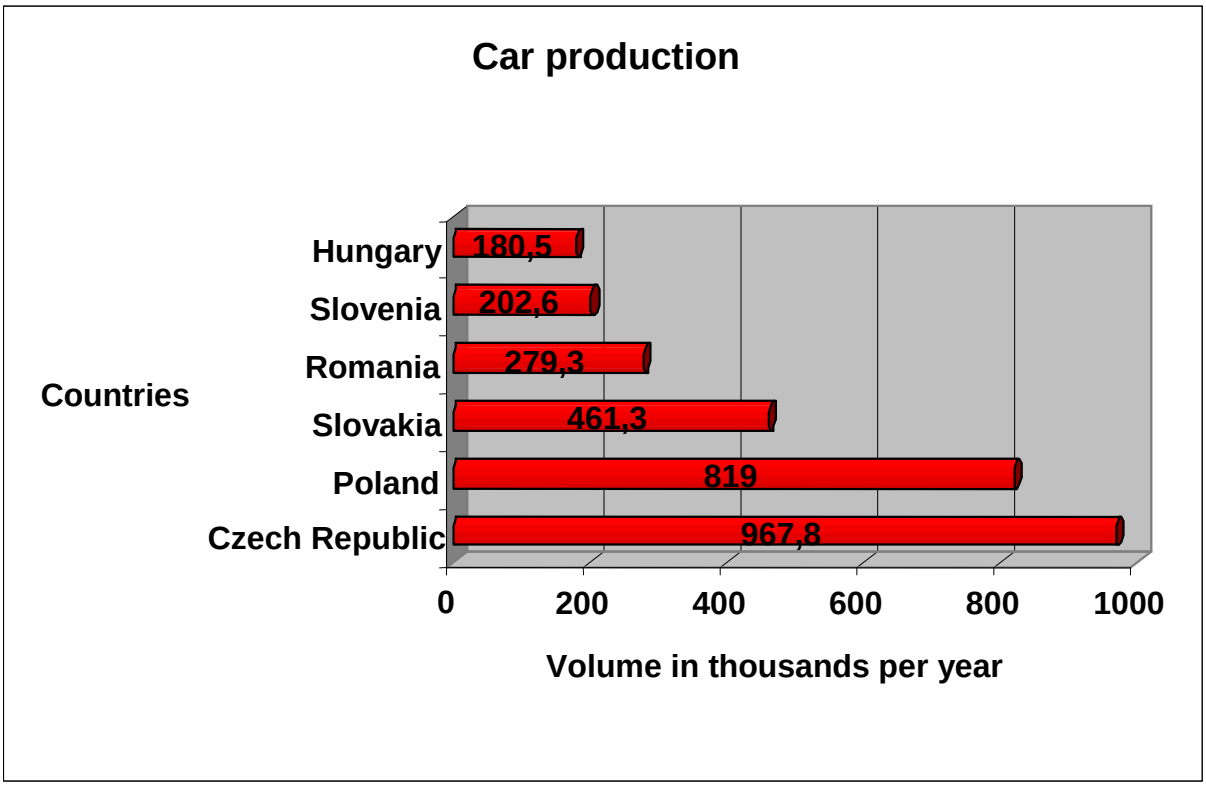
However, the positive trend collapsed suddenly in 2008 by the global crisis. This year, the inflow of foreign investments in the automotive sector was negative and amounted to -324.6 million. Negative balance of foreign direct investment in the automotive sector has its source primarily in the major balance sheet losses incurred by foreign companies operating in Poland automobiles. As a result of reinvested earnings, net of one of the components of capital inflows to the Polish, adopted a negative value of -212.7 million. In 2008, the automotive sector was a noticeable decrease in the cumulative value of FDI from 6.5 to 4.7 billion euros.

The automotive industry most severely felt the decline in investment compared to other industries. Despite the fact that the cumulative value of foreign investment in 2008 declined in almost all sectors, the negative value of foreign capital inflows were recorded in:
- automotive sector,
- wood industry,
- publishing and printing,
- manufacturing consumer electronics and communications products.

The effect of this was that the automotive industry has lost item with the highest total value of foreign direct investment in Polish industry to the food and tobacco industries and metal. In 2009, the inflow of foreign direct investment in Poland has decreased over the previous year by 17.7%. Particularly large declines were recorded in the automotive sector - was one of the industries most affected by the crisis on a global scale. As for the automotive industry, it announced the launch of new investments:

- Fiat Powertrain Technologies,
- AAM Poland,
- Guardian Automotive Poland,
- TBAI Poland,
- VOSS Automotive Polska.

As a result, foreign investment carmakers Poland became one of the largest car manufacturers in the region of Central and Eastern Europe. From among the 40 factories involved in assembling cars or car engines in the region, 16 are located in Poland. Poland is the second largest producer of passenger cars in the region - in 2009 there were produced 819,000 vehicles of this type.



the number produced cars in Poland. In 2008, it grew up by 21.2%. In 2009, the most difficult for the global automotive market, managed to keep production at a similar level. The annual production decreased by 2.7%. In the same time production in Czech Republic increased

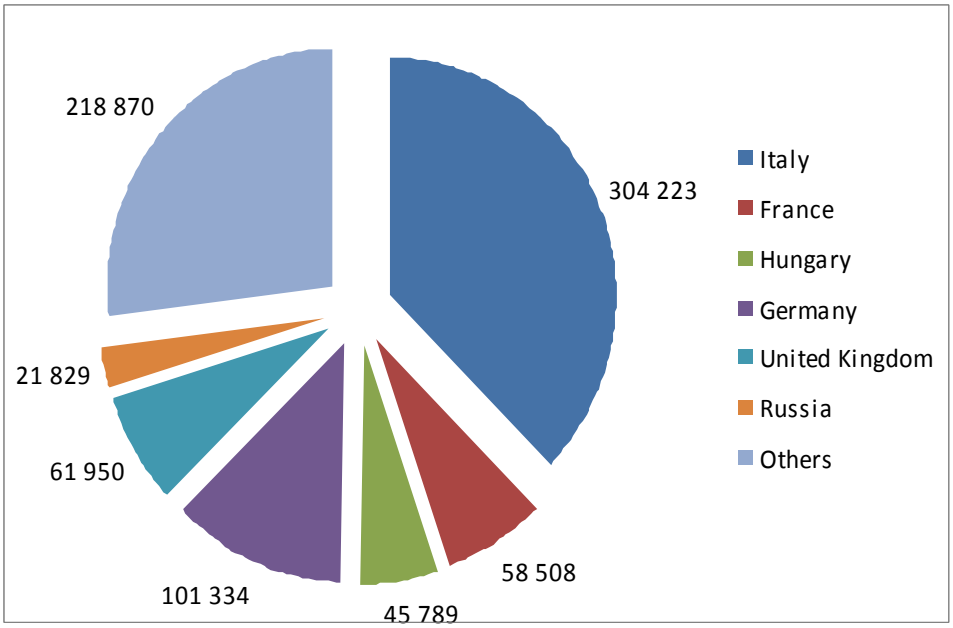
slightly, while in Slovakia has fallen sharply - by 20% in 2009. The largest decline in production took place in Hungary. In 2009 there were produced nearly half the cars than last year. Despite the crisis, output increased in the last two years in Romania and Slovenia. As for the production of vans and buses, Poland is the regional leader. In 2009 there were produced 55 thousand vehicles. Romania, the second largest producer, produced in the same period nearly 17,000 units, the third Slovenia - over 10 thousand.

Several international automotive companies established in Poland, a significant part of its European production capacity. As is apparent from the OICA data, in 2008;

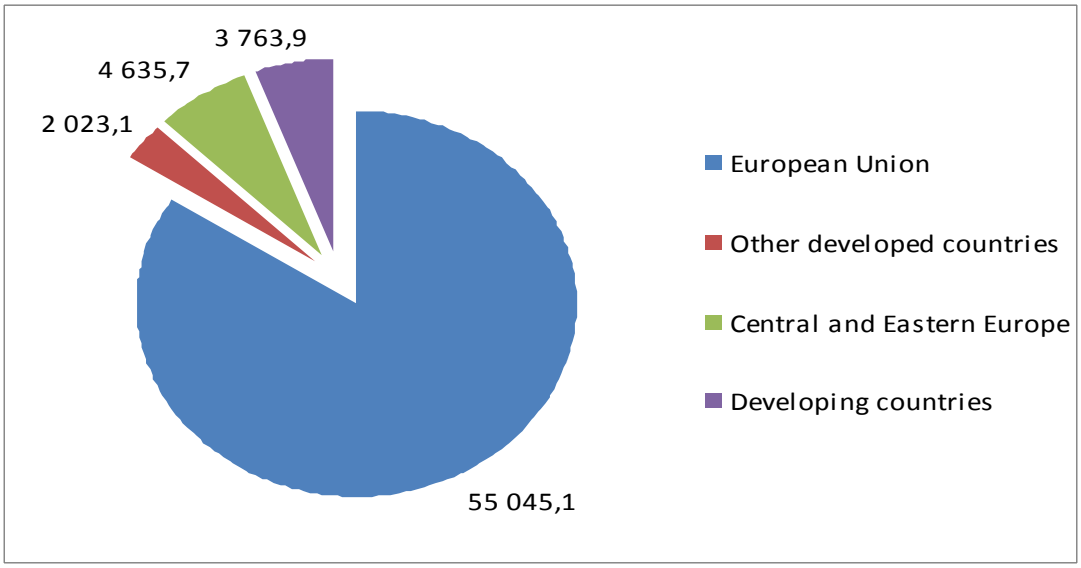
- one third of European production came from the Polish Fiat.
- General Motors - 18% of European production is in Poland
- Case of Poland Vwolswagena accounted for less than 3% of production,
- MAN - production of trucks and buses, 14% of cars produced in Europe comes from Polish.

Polish automotive sector is almost entirely export oriented, his condition is very strongly dependent on the situation on foreign markets, especially Western Europe. Only in 2006 alone, the increase calculated in constant prices amounted to 22.2% and year later - 13.8%. The global crisis has significantly slowed sales growth of Polish factories. Particularly severe were the last months of 2008, when production began to decrease gradually sold over the past years, going back to 2005 levels. On an annual basis, however, managed to work out an increase of 7.7%. The year 2009 was a difficult period for the whole Polish industry. In 2008, the value of exports of the automotive sector was 65.5 billion dollars, which accounted for 16.1% of all Polish exports and exports up 21.8% of Polish industry.

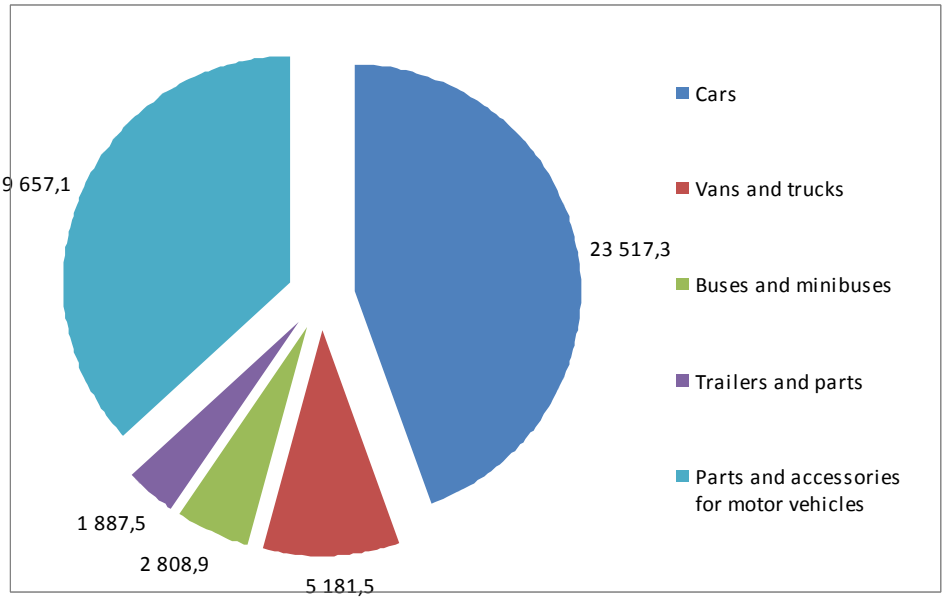
Destinations of exports of the automotive sector in 2008						
cars in numbers						
Italy	France	Hungary	Germany	United Kingdom	Russia	Others
304 223	58 508	45 789	101 334	61 950	21 829	218 870



Directions automotive exports in 2008 (in millions zl)			
European Union	Other developed countries	Central and Eastern Europe	Developing countries
55 045,1	2 023,1	4 635,7	3 763,9



Exports of automotive products in 2008 (in millions zl)				
Cars	Vans and trucks	Buses and minibuses	Trailers and parts	Parts and accessories for motor vehicles
23 517,3	5 181,5	2 808,9	1 887,5	19 657,1



3. Research and Innovation

26 of July 2000 Delphi Company opened the Delphi Technical Center in Krakow (TCK) as one of 34 centers in the world (10th in Europe). Currently, the Technical Centre employs over 550 people, mostly Polish engineers who have received training abroad in Delphi. The first Polish Technical Center is designed to support activities for the global customers of Delphi and engineering research in close collaboration with other research centers - business development. Within several months of the commencement of the TCK passed the QS 9000 certification process, as well as ISO 14001, and at the end of 2002 it has implemented a quality system ISO / TS 16949 TCK has become the global center for the work in the field of shock and columns of modular systems. The task is the center of engineering products and processes, preparation of prototypes and models and the testing laboratory and production of suspension systems. For the success of Polish engineers, among others include the Delphi design shock absorbers for the Citroen C3 - currently produced in the Delphi factory in Krosno. Recently the center of Cracow started to work on advanced technology active dampers MagneRide. In addition, works are covered by the TCK areas: harnesses, switches and sinks of fuel vapors.

Regional Development Agency "MARR" Joint Stock Company in Mielec is a coordinator of the consortium "Claster Green Stream". The project aim is to initiate the development of the electric vehicle market in Poland and the development of distributed energy using renewable energy sources.

4. Education

In south east Poland we have three Technical University.
Rzeszow University of Technology operates Faculty of Mechanical Engineering and Aviation, where trained specialists are, the fields of avionics, pilot, aircraft engine construction. There also operates Department of Motor Vehicles Internal Combustion Engines. Education students at the specialty-car vehicles is based on a broad base of general science, basic theoretical and technical. Graduates of this specialization receive comprehensive preparation in the field of design, technology, manufacturing and maintenance of motor vehicles and internal combustion engines. The focus of graduate education is placed on mastery of modern methods of construction with computer-aided, knowledge of major technologies and production systems that reduce material waste, improving quality of products and increase the durability and reliability of vehicles in operation. Students also learn about ecology and the theory of modern vehicle diagnostic systems. Graduates are prepared to work both in manufacturing and back-office research - development industry and academic institutions and technical universities.

As can be seen in Sub-Carpathian region are trained professionals by automotive and aerospace industries. In addition, Rzeszow University of Technology conducted numerous scientific studies. The main emphasis is on improving its engines and motor vehicles. In the study, the researchers also raise issues related to ecology, nuisance motoring on the environment and the impact of motoring on the environment.

One of the main technical universities in South – East Poland is the Cracow University of Technology. Educating students on the direction of Mechanical Engineering will have a basic knowledge and skills necessary to understand the issues of construction, manufacturing and maintenance machines. They should also have a thorough knowledge of the mechanics and design, using modern computational tools. Currently, the Faculty of Mechanical training is

majoring in Mechanical Engineering, among others in the field of specialty Construction and Motor Vehicle Studies.

Next University in this part of county is Technical University of Lublin Department of Motor Vehicles operates. Students are educated in the fields of: Vehicles, Operation of Vehicles, Electrical and Electronic Vehicle and Vehicle Diagnostics. Scientific research includes the design and optimization of control programs, automotive hydromechanical transmission, the use of biofuels to power internal combustion engines, operate and troubleshoot electrical and electronic systems of vehicles.

Conclusions

All are dependent on cars, but what is the future of the industry overloaded with excess services, too large installed capacity and the limited diversification of products? The production volume and thus sales of new cars, are most important for vehicle manufacturers, and the struggle for the amount of sales continues. Cost reduction is therefore a necessary element in maintaining competitiveness, as the new producers with lower costs, achieve a high level of quality. Competitive pressure is greater than ever in the past. Increased sales and lower costs are the conditions for survival.

New sales are the key to sustainable growth, generating - through financial and after sales service - additional revenues and resources for further research and development. With more and more similar products, the key to success is "getting closer to the customer" - a difficult challenge, given the franchise retail model, for both vehicle manufacturers and parts suppliers.

The Internet is the key to success, as a source of information and integrated communication tool, not less, however, very few companies take full advantage of the direct customer relationship, which the Internet provides.