

FROM THE CHALLENGES IN AUTOMOTIVE INDUSTRY TO CENTRES OF EXCELLENCE

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Abstract

The aim of this article is to outline the main reasons for development of cooperation between universities, R&D centres and companies from the automotive industry. At the beginning of the article, there is given a short history of automotive industry in Slovakia. Next part defines Centres of Excellence and main reasons for their developing. The Project AUTOCLUSTERS – The international cooperative network of educational and research institutions with subcontractors and other bodies active in automotive industry serves as an example of cooperation between researchers and practitioners.

Key words

automotive industry, centre of excellence, cluster, project, Slovakia

Introduction

The industrial development is a consequence of changes not only in Slovakia, but in the global market as well. Automotive industry, which also plays an important role for other industries has become a key industry for development of the Slovak economy. By opening Slovakia to foreign investors in automotive production, the sector has become a part of the European economy. Competitiveness not only in Europe but also in the global market requires high quality products, especially in the car section and effective quality control processes.

Automotive industry in Slovakia

The first foreign automotive factory - Volkswagen Slovakia (1991 - Agreement on cooperation with the car manufacturer „Bratislavské Automobilové Závody”) began its

operations in Slovakia at the time of the Czechoslovak Federal Republic, and then after Slovakia gained independence, Volkswagen AG entered the Slovak market (1994).

After 1998, the Slovak government decided to support the automotive industry by assessing a special tax, what of course resulted in increased interest at the Slovak market and supported the flow of new investment. In a short time more than 120 companies, such as U.S. Steel, Continental, Magna, Siemens, Delphi, Krupp, Faurecia, Leoni and others came to Slovakia. Today, companies like Volkswagen Slovakia, PSA Peugeot Citroen, Kia Motors Slovakia have their plants in Slovakia.

Arrival of transnational automotive companies brought along the need to build up a network of subcontractors. This required not only building industrial parks, but also creating better business conditions for the entry of new investors - subcontractors of the automotive industry.

The situation in 2009 can be summarized as follows. Production of cars in Slovakia in 2009 reduced by almost a fifth, the total number of 463 140 pieces. Slovakia has not led to the production of cars per capita. Slovenia became the largest producer, in terms of such a conversion, the second place was taken by the Czech Republic followed by Slovakia. The production drop was mainly influenced by about 50% production decrease in Volkswagen Slovakia.

PSA Peugeot Citroen with a total production of 207 128 vehicles became the largest car producer in Slovakia in 2009. The Korean carmaker Kia Motors Slovakia with 150 015 cars occupied the second place and the third place was taken by the German carmaker Volkswagen Slovakia with 106 000 pieces.

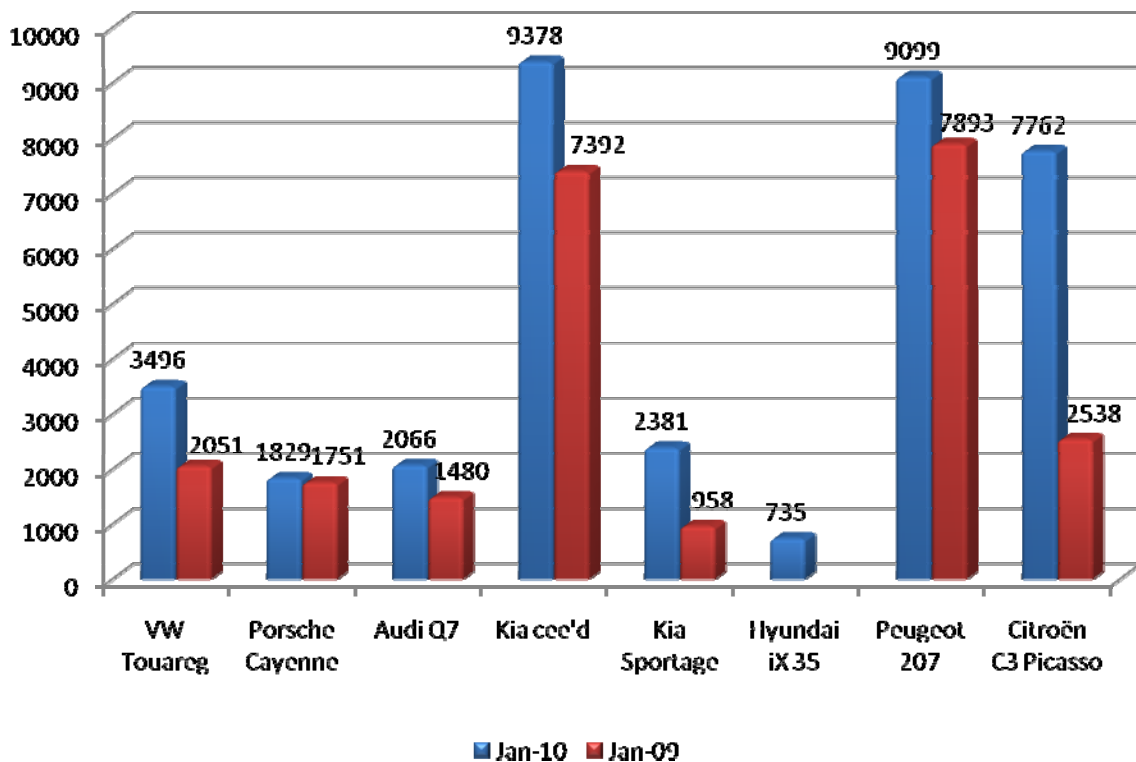


Fig. 1. Production of automotive factories in Slovakia in January 2010 and January 2009 [J.D.Power Forecasting]

Total production of cars in Europe fell to 13.4 million units, representing a 13% reduction. However, data from the first month of this year indicate a significant increase in the number of cars manufactured in Slovakia. According to estimates of the global marketing information services company J.D Power Forecasting, automotive factories in Slovakia produced 53% of cars more than in the same period last year (Fig. 1). As estimated by the Ministry of Economy, the situation in the automotive industry should stabilize in 2010. Expectations of the Ministry talk about increased car production in Slovakia up to 544 000 units and in 2011, even up to 900 000 units. [2]

Centres of excellence

The development of the automotive industry in Slovakia and Slovakia's membership in the EU has increased needs of research and development, requirements for skilled and trained workforce, needs to adapt new ideas and trends to Slovak conditions. Educational institutions in Slovakia almost immediately began to react to the situation in the automotive industry and prepare a qualified workforce. Work with technologies has been pushed into the background. Companies began to realize very soon that if they want to survive, they must increase their innovative and creative potential.

Therefore, it is necessary to build, in particular regions of Slovakia, high-tech centres focused on development and construction issues, simulation, producing of prototypes and providing tests, which would enable to make use of brain power potential of universities to solve practical business needs. Such a system of centres on the one hand helps significantly to link the practice requirements with capabilities of universities, on the other hand, it significantly increases the chances to improve the innovation level of companies. Those centres would be technological leaders involving high quality researchers, and creating the basis for the needs of society in order to develop and further knowledge in various fields of research. [1]

Centre of Excellence is a research and development organization, which is involved in international scientific and technological cooperation with the added value for the European Research Area. The results of its research and development are intended for economic and social practice in the Slovak Republic and are reflected in the training of new researchers. [3]

Minister of Education Ján Mikolaj informed on 27 May 2008, that Slovakia would have the first Centres of Excellence in 2009. Centres will play a role of excellence workplace reaching the European and world level. 25th August 2008 was the deadline for applications for financial contribution to these centres. Budget for the network of centres was designed at 48,2M Euro. [4]. Faculty of Materials Science and Technology in Trnava responded to this challenge, succeeded with two projects and in 2009 began to build one centre in the field of machining technology and the other in the field of materials sciences.

These centres are:

- **Centre of Excellence in 5-axis Machining.** Principal investigator of the project is prof. Dr. Ing. Jozef Peterka. The Centre focuses on the production of complex shaped surfaces using 5-axis technologies (milling, turning, ultrasonic machining). Centre builds up equipment with high-HSC, multi-axis and multi-energetic technologies, unique in Slovakia. Facilities Center - 5-axis CNC milling centre enables research in the areas of design and manufacturing complicated open shaped surfaces, CNC lathe with mandrel extend research into area of so-called complex shaped surfaces and Ultrasonic Machine CNC explores the so-called difficult-to-machine and complex shaped surfaces.

- **Centre for Development and Application of Progressive Diagnostic Methods in Processing Metal and Non-metal Materials.** Principal investigator of the project is prof. Ing. Jozef Janovec, DrSc. Centre of excellence will provide research in a wide spectrum of materials (from glass to metals) and with exceptional possibilities for volume and surface material analysis. There will be available modern equipments for spectral and diffraction analysis, equipment for analysis and determination of mechanical properties as well as detailed characterization of microstructure. This centre of excellence will be fully compatible with European research territory and will contribute in economy and knowledge progress in region.

Each project is subsidized by almost 1 327 700 €, giving a total nearly 2 650 000 €. [5]

Not only the mentioned projects, but also the abilities of Slovak researchers and developers have convinced some foreign companies that Slovakia is the right choice for setting up R&D centres. Evidence of this is the fact that various renowned companies built their Centres of Excellence in Slovakia: Johnson Controls, ON Semiconductor, Leoni, BSH, Wabash Technologies, Thermosolar, Sauer Danfoss, Ness, Hanil E-Hwa Automotive, Siemens, Alcatel Lucent and others.

In general, it is possible to say that the Centres of Excellence conduct concentrated research in a scientific discipline which is important for country development. The results of its research and development are exploited in economic or social practice. The results of research and development centres are useful to use in education primarily for researchers, as well as in the process of higher education. Centres' employees are generally characterized as a highly skilled professionals and the research infrastructure corresponds to international standards.

Centres of Excellence can provide a comprehensive experience for the needs of final manufacture and production of components can help eliminate the deficit in science and research in processes and not least, will transform the manufacturing suppliers into the development and production suppliers. The main task of the centres is exploiting the latest knowledge and producing valuable innovations by combining the best experts and cutting-edge technology. The value of the centres' results is increasing with their application in practice or with direct involvement of practitioners in the process of research and development.

Project AUTOCLUSTERS – cross-border cooperation of 9 countries

The monitoring Committee AUTOCLUSTERS approved the project AUTOCLUSTERS in Budapest on 6th July 2009. The lead partner of the project is the Automotive Cluster - West Slovakia, with 11 participating partners from 9 countries of Southeast Europe. The project should ensure transfer of knowledge and innovation between the partner regions. The Project brings together Universities, R&D institutions, SME support facilities from EU-15, NMS (New Member States) as well as IPA to prepare and create the first automotive network in SEE. The project is focused on implementing new technologies in enterprises; provide training high-skilled technicians, cooperation in the development of products and technologies through newly developed projects.

This project focuses on solving problems, grouped into 3 main areas:

- Requirements for implementations of new technologies, particularly according to new European strategies and policies

- Innovation capacities - Lack of labour on the market mainly in the area of highly qualified workforce for automotive industry
- Innovation circle - Lack in cooperation between R&D (universities), SME's and car (part producers)

In the case of NMS (New Member States), candidate countries, potential candidate countries and neighbouring countries there is still cooperation between industries and universities at lower level, an issue which is negatively affecting the sustainable development of the automotive industry in SEE.

The project's aim is to develop the network of existing SME facilities together with R&D or universities in automotive industry. The purpose of the project is to realize second level clustering activities with objectives to increase innovation capacities, increase effectiveness of technology transfer – improve the innovation circle in automotive industry, and through the project clearly address the global objectives – facilitating innovation, knowledge economy and information society. The contribution for improving the attractiveness of the region should be taken in account. The invitation of the partners from EU-15, NMS and IPA countries together with proposed activities including intensive cooperation and knowledge-exchange is a clear contribution for the EU cohesion policy by diminishing the gap between participating regions.

The project is carried out in seven work packages. Two of these packages are focused on innovative trends and main challenges in the automotive industry (WP4 - Innovative trends and main challenges in Automotive) and the pilot project of cooperation of Centres of Excellence (WP6 - Pilot R&D cooperative projects). The main output of WP4 is a feasibility study - Innovative trends, challenges and opportunities for cooperation with centres of excellence in the automotive industry. WP6 is focused on the possibility of implementing projects with Centres of Excellence.

Conclusion

The article deals with main reasons for the development of cooperation between R&D centres, universities and business practice. There are, in the context of the automotive industry development in Slovakia, created Centers of Excellence supported by the government. The project AUTOCLUSTERS - a cross-border cooperation project of 11 partners from 9 countries is a concrete example of cooperation between the subjects from research, education and experience areas. This article is output of „Project AUTOCLUSTERS – The international cooperative network of educational and research institution with subcontractors and other bodies active in Automotive industry“, which is receiving funding from the EU under the SEE Programme.



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