PERSPECTIVES FOR DEVELOPMENT AND INNOVATION IN AUTOMOTIVE INDUSTRY

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Abstract:
Innovation and R&D activities are central to competitiveness. The ability of firms to compete in foreign and home markets depends crucially on innovative products that can be produced and sold at attractive prices. In the short run, productivity and labour costs are important competitiveness factors. In the long run, the ability of firms to innovate and invest in R&D take over as crucial determinants of competitiveness.

Key words: *innovation, automotive industry, R&D, competitiveness*

JEL classification: *O332, L662*

The competitiveness of the European automotive industry is intimately intertwined with the success and continuity of its research and development efforts, which form an important part of industry's competitive position. This is reflected in the volume of investments, which the industry channels into R&D: the automotive industry accounts for approximately 20% of the manufacturing R&D investment in Europe, totaling about €20 billion a year. As such, the automotive industry is one of the main R&D investors in Europe. The current global competitive environment is also witnessing a significant R&D effort by manufacturers from other parts of the world. In particular, there has been a stronger shift by the European automotive industry's main competitors towards intensifying R&D in areas such a hybrid technology and hydrogen. The fiercely competitive global market necessitates an efficient use of limited research resources and an effective partnership between the public and the private sector in the field of R&D. R&D investments are a key factor to maintain and enhance the competitiveness of the industry and provide the basis for integrated technical solutions addressing concerns associated with the road transport system. Of particular relevance are issues related to safety and security as well as the perceived impact of the road transportation system on the environment. In addition, R&D investment is essential to maintain and increase the level and quality of employment in Europe.

The European automotive industry strives to be the most innovative in the world and sets global standards in production and vehicle technology. New technological possibilities will continue to play an important role in addressing the enormous challenges arising from the expected future demand for transport for people and goods in Europe. Identifying solutions which are truly effective and sustainable will require more, however, than just the development of cleaner engines, alternative drive concepts, better vehicle aerodynamics, lower rolling resistance, telematics solutions and advanced electronic vehicle systems.

European mass produced road vehicles must continue to be affordable and of world class standard in an ever-increasing competitive global market. This will be achieved through innovative engineering and manufacturing/production processes, the efficient use of existing and new raw materials, as well as through the retention of R&D, design and production skills and facilities in Europe.

Challenges

The ever-increasing demand for raw materials is leading to frequent market price rises and fluctuations and uncertainty in the flow of supply. The need to develop and adopt energy and material efficient processes and production has never been greater. The environment of the automotive industry has changed significantly over the past decades due to technological advances, automation of production, regulation and increasing competition from outside Europe. The optimisation of production efficiency and costs remains a challenge. The availability of raw materials will remain a central challenge of the mid-term future. Besides forecast shortages in the oil and gas sectors, demand for materials like platinum, nickel, steel and copper will have significant upward impact on prices. From the aspect of competitiveness, the challenge for the industry will be how to use rare raw materials in the most efficient way so as to continue production and avoid supply crises due to continuing increasing demand.

The trends towards development of more efficient and cleaner vehicles should be sustained by a parallel effort to decrease energy consumption in production and recycling processes. The high cost of employment and a significant ageing population in Europe pose further challenges to the automotive industry especially concerning ergonomic design and manufacturing. The automotive industry requires highly educated and skilled employees for the design and development of appealing, competitive and affordable quality products, which comply with emissions and safety legislation. In this context an R&D environment that supports the world leading technical edge of the automotive industry in Europe is a necessity. Future material developments and manufacturing processes are essential key factors of vehicle technology innovation. New materials and new processing technologies serve as basis of increased competitiveness by increasing the perceived value of the vehicle while maintaining or reducing cost and investment. Adequate manufacturing systems including new forming, joining, assembly, surface protecting and painting processes are necessary. Progressive R&D allows to profitably use new materials coming from basic and industrial research and to overcome technical constraints and economic boundaries.

In 2015, 40 percent of the world population will live in cities with more than one million residents, 17 percent will live in megacities with more than five million residents. The cruising speed in these cities will average not more than six miles per hour while the typical driver will use his or her car three hours a day. Car design for this environment will take a very different approach from that of current vehicles. Some new focal points will be:

- Easy switching between relaxation and driving positions;
- Emphasis on passenger entertainment and information systems;
- Automation of stop-and-go traffic situations;
- Concealment of passengers from outside viewers;
- Protection of passengers from attacks;
- Effective smog protection and air conditioning;
- Nearly zero emissions

Analyzing the direction and speed of market changes, and anticipating future customer needs will shift the focus of the entire organization: Long-term corporate targets become clearer and far more important, and the innovation focus widens from incremental improvements to system innovations. One example: For its future range of products, an electric and electronics producer in the European car industry has identified an increasing customer need for mobility, safety, comfort, seamless connectivity and ease of use. Despite strong growth in China and India, the company's main markets will remain Europe and the United States. Based on these assumptions, the company developed a vision of the future driver interface, defined the types of electronics it

wants to produce in 2020 and devised a strategy to gradually evolve its current product range from the traditional focus on cockpit electronics to integrated driver interfaces (Human-Machine Interfaces) and security systems. A key element in this strategy is a strong collaboration with consumer electronics partners and a R&D joint venture to integrate procured infotainment functions.

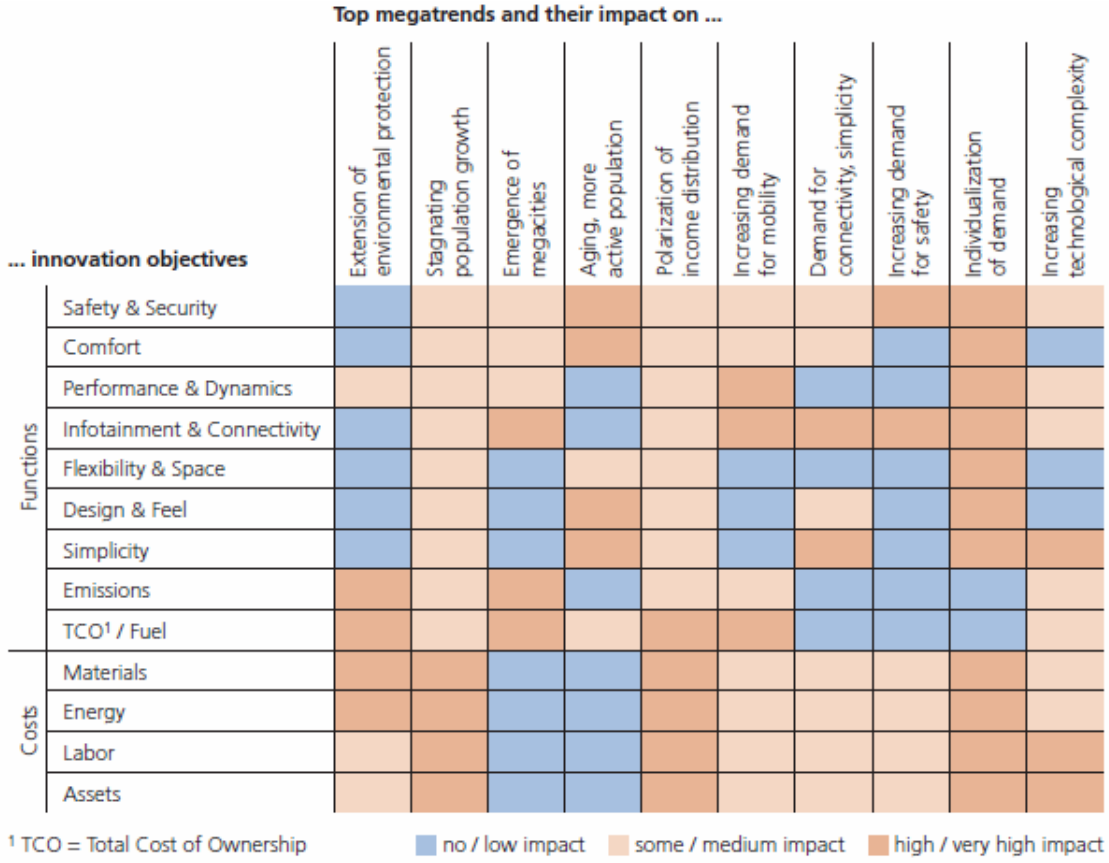

Figure 1 Impact of megatrends on automotive industry *(Sursa: Car innovation 2015 - A comprehensive study on innovation in the automotive industry)*

Like we see the automotive industry is destined to become an" investment engine". However OEMs will be able to sharply reduce their annual investment need (development and production)

Remarks:

- total annual investment will increase by 2.6% p.a. on average;
- the main driver for the increase will be expansion investments to achieve growing production figures;
- the asset intensity will remain at a high level because, investments will be made in new plants in emerging markets and productivity will be driven higher in established markets through robotics;
- owing the sharp increase in sales revenue, the investment ratio of OEMs will drop from 5.4% in 2002 to a mere 3.4% in 2015

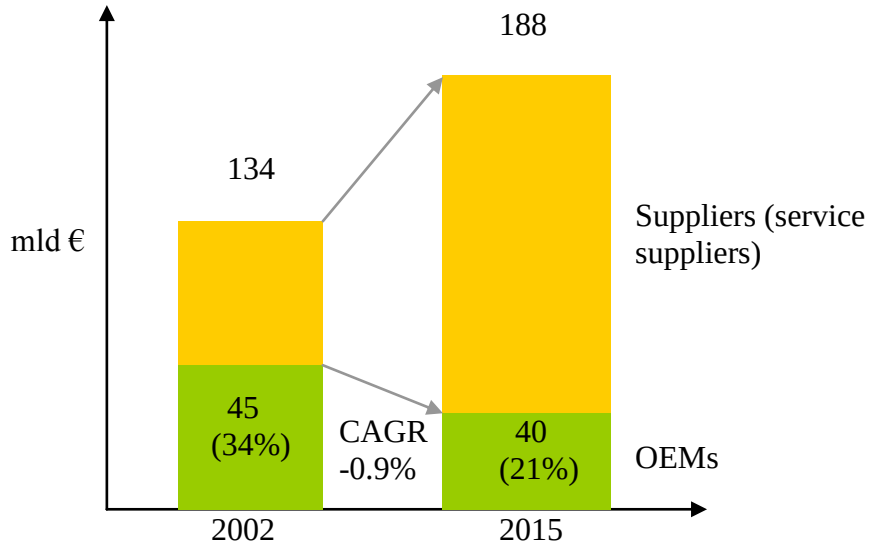

Figure 2.: Total annual investment *(global, mld €)*
(Sursa: Mercer analysis)

A closer look at R&D spending by both OEMs and suppliers shows that around 40 percent of all investments go into innovations that never make it into the car or are never produced in sufficient numbers due to a lack of market acceptance. Of the remaining 60 percent, 20 percent is for necessary serial development. Another 20 percent is for innovations that fulfill legal requirements but do not add to a product's distinctiveness. Usually, these innovations do not pay off either. That leaves only a small remainder of 20 percent that represents profitable innovation investment. And more and more technologies are fiercely fighting over this sweet spot. Only around ten percent of the automotive technologies under development at the moment have the potential to become blockbuster innovations. These technologies combine the two most relevant categories: The first category, market potential, consists of functional purpose, customer acceptance, regulation compliance and price level. The other category, a high degree of innovation, creates technological differentiation in the market, better intellectual property protection, high margins and a long harvest period.

Conclusion:

Automotive companies must increasingly focus their innovation efforts on a very limited number of promising projects. In order not to place their bets blindly, they have to carefully assess the potential and risks of the technologies they want to explore and regularly reassess them.

Existing technologies, as well as technologies under development, always face the possibility of being pushed aside by alternative developments. In order to assess the technological and market potential of a given technology, its respective car module must be analyzed in terms of the key technologies being used, current trends and future innovations. The chances and risks of a given technology are also influenced by the different market structures, competitors and business models in each segment. Innovation cycles are constantly shortening while development costs are rising due to the higher complexity.

Electrics and electronics will remain the most important enabler of automotive innovations through 2015 and beyond, and will grow by six percent annually. The sweet spots with a revenue growth of eight percent and more will be software, semiconductors,

displays and power generation. Still, electronics will also face increasing cost-optimization pressures. Significant shifts will occur toward functional integration and carry-overs, and toward further standardization. As more and more automotive functions become interlinked, a noticeable move from single innovations to system innovations is occuring. Whereas one device used to have one single function in the past, more and more devices will be used for two and more purposes in the future. One example of this evolution is the Mercedes-Benz PRE-SEIF system. It links existing systems like crash sensors and ESP with seat controls, seatbelts and the sunroof, adding safety functions to existing components.

The single most important innovation focus of the industry lies in emissions / fuel efficiency / weight, with new power-train concepts and architectures evolving. Through 2015, the production of power trains that use the traditional fuel of gasoline will decline 0.3 percent annually from 48.5 million units in 2005 to 46.5 million. Diesel engines will experience annual growth of 2.1 percent, from 12.6 million to 15.8 million, while alternative-fuel vehicles (biofuel, natural gas) will grow up to 3.8 million units per year through 2015. The strongest growth will be in hybrid power trains, with a compound annual growth of 21.4 percent, reaching 11 percent of all power-train concepts through 2015 (micro 70 percent, full 24 percent, mild six percent). Fuel-cell power trains will reach significantly less than one percent of production.

Hybrid power trains will experience an annual growth rate of more than 21 percent through 2015, making this one of the premier automotive growth markets. In 2015, 11 percent of all cars will be hybrid. But full hybrids will account for only 24 percent of this market, due to the high additional costs and weight. 70 percent of all hybrid cars will be so-called micro hybrids, which are limited to recovering braking energy for use during acceleration and a start-stop function. Market acceptance will be high for hybrids in urban areas around the world, and the technology can be communicated easily, especially for micro hybrids. Hybrid technology is very versatile and, therefore, very universal: It can be used with all sorts of combustion engines – gasoline, diesel, natural gas and alternative fuels.

Additionally, the architecture and components for hybrid cars are very similar to those of fuel-cell vehicles and electric cars. Hence, hybrid developments will position companies well in the potentially vital fuel-cell market of the future.

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