

RESTRUCTURING THE VALUE CHAIN IN AUTOMOTIVE INDUSTRY*

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Abstract: *The companies in the automotive industry follow different strategies in order to cope with developments in their environment including markets, competitors, regulation, shifts in values, economic cycles, societal demand, factor cost and availability. Quite contrary to the situation a few years ago with „lean production“, there does not seem to be „one best way“ how to organize the production of cars. They are enabling technologies and ideas or progress in relevant sciences thus incorporating technological as well as organizational, managerial, or qualification measures. The main demands in the future will be: increased flexibility, growing individualism, speedy innovation, continuous cost reduction.*

Key words: *Restructuring, Value chain, Competitiveness*

1. INTRODUCTION

In the recent past, a number of trends in the automotive industry have been obvious, namely a sharp decrease with respect to the number of independent OEMs and the opposite trend with respect to brands and car models. However, it is far from clear whether this will continue. This is also true for the share of work between OEMs and suppliers. In the last years, the vertical range of manufacture has dropped with OEMs quite significantly from 23 to 30 % while the supply volume has quadrupled. In this context, new forms and frontiers of competition arise or are already to be observed. Besides the horizontal competition between suppliers for a certain part (or system),

- manufacturing departments of the OEMs compete with suppliers,
- decisions on the vertical division of work within a supply chain become less obvious, and
- tasks shift between the production and the service sector in both directions.

The project team tried to identify typical general as well as individual strategies in the sector. This was only partly successful for two reasons. Those familiar with company specific strategies were often reluctant to disclose them. Others, addressed as technical experts, hesitated to talk about such aspects in more than a fairly general way. Given this background, which discusses several issues including supply chain management, new organizational concepts, I refer to existing studies and their results.

2. TECHNOLOGY TRENDS

In the following section, several technology topics will be listed that were derived as possible

issues for research that would help to ensure competitiveness of car manufacturing. Nevertheless, car manufacturers, for obvious reasons, will not go very much beyond what is regarded necessary from an economic and market point of view on their own. Furthermore, sustainability criteria will not be integrated in these research projects as much as they could be.

As the directions of many developments are still unclear and a large diversity of concepts is emerging, it seems reasonable to employ highly targeted funding strategies to bring sustainability issues into all the research topics that are important in the sector at the moment instead of focusing on particular technologies. Hopefully, from such a multitude of approaches, a variety of customized sustainability solutions adequate for different contexts will arise.

The list presented here should be seen as tentative. In addition, it should be noted that diffusion of technologies that are currently established only in some companies might be well worth funding for reasons of competitiveness and sustainability. Many of these technologies are already under way or even used by advanced large-scale manufacturers, but are still far from being applied by SMEs.

Experts from industry pointed out that funding should emphasize fast and cheap applications. It was proposed to build pools of possible users for research projects as well as joint projects between providers (e.g. of software or machine tools companies together with users). It was mentioned how there might be resistance to co-operate between competitors, but that such co-operations will be essential for competitiveness.

In the following overview areas of research topics are listed.

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Design and manufacturing of light weight materials

- titanium extraction (lower price)
- joining technologies for different light weight materials with view to recycling / re-manufacturing
- colored plastics (alternatives to classical coatings)

Advanced manufacturing processes

- laser technology
- mechatronic
- rapid manufacturing, rapid tooling
- nanotechnology for coatings, sensors, and catalysts
- hydroforming (or other methods for varying material thickness)
- soldering without lead (process control, quality assurance)
- manufacturing of multi-material components (with an integrated assessment of sustainability concerns like recycling and emissions but also effect on working conditions in manufacturing).

Near net shape processes

- powder-metallurgy, sintering (especially application oriented, view to recycling important)
- rapid manufacturing
- closed mould injection processes (aid small companies)

Process simulation

- simulation of new materials as well as simulation of the interface between tools and materials
- simulation of forming processes especially bending e.g. of magnesium. Actors from software suppliers as well as manufacturers have to be involved

Planning and control of manufacturing processes

- methods for recycling environmentally friendly product and the process design needed in order to produce them
- integrated automation concepts
- control technologies with adequate sensors (especially for welding and bending)
- standards for electronic systems as well as for software and control systems
- man-machine interfaces
- virtual reality for planning of manufacturing (with a view to social sustainability aspects)
- simulation and expert systems to aid quality control in electronic systems production (reliability-simulation), especially for soldering. Possible research

constellation: European user and provider companies in soldering. This project would especially aid soldering without lead.

3. RESTRUCTURING THE VALUE CHAIN

The OEM as a brand owner reduced to core competencies such as design, marketing, and system integration constitutes the one end of the spectrum of possible futures of the automotive industry. The (re-)integration of sales, design, manufacturing, re-manufacturing and recycling with OEMs could be the other end. The decreasing vertical range of manufacture with OEMs, the growth of contract manufacturing by specialized companies/assemblers (like Valmet or Magna), or the increasing responsibility of suppliers – and engineering firms – for technological innovation seem to support the first vision. However, there are some indications of a shift back towards the latter. Some OEMs seem to be re-thinking their core competencies and others are aiming at building-up or maintaining production/process knowledge by increased R&D for example.

Another dimension of the restructuring is the geographical allocation of the supply chain. Again, the spectrum is broad and ranges from local clusters („supplier parks“) to global sourcing concepts. Diverse concepts such as “manufacturing close to the market” or “centralization in order to achieve economies of scale” are emerging in parallel. The respective size and integration of the sites belong here as well. Several new and specific plant concepts such as the „gläserne Manufaktur“ (transparent craft factory) of Volkswagen in Dresden, Germany, or the SMART manufacturing consortium in Hambach, France, have been developed. Green field sites with comprehensive compensatory ecological measures (e.g. Rastatt factory of DC in Germany) exist beside ambitious attempts of “sustainable factory renewal” (e.g. Rouge factory of Ford in USA). Especially where space is disposable, condominia of OEM and suppliers are tested (e.g. Skoda).

Consequently, there are different types of supply chains and supplier roles. The suppliers respectively need and have different competencies. Although a further segmentation and specialization of the value chain is expected along dimensions like innovation and cost, application and process, a large variety of successful strategies may still be performed. Even if the predicted concentration of the automotive suppliers (the top 20 will share 50 % of the volume in 2010 against 27 % today and only 3500 of 5500 companies will survive) is realized there is room and need for different

business models (see figure 1). The diversity of company competencies and their interlinkages – e.g. through the sharing of platforms – may actually be an important success factor for the automotive industry in Europe to achieve both innovation and productivity. Thus suppliers become an important driver for innovation.

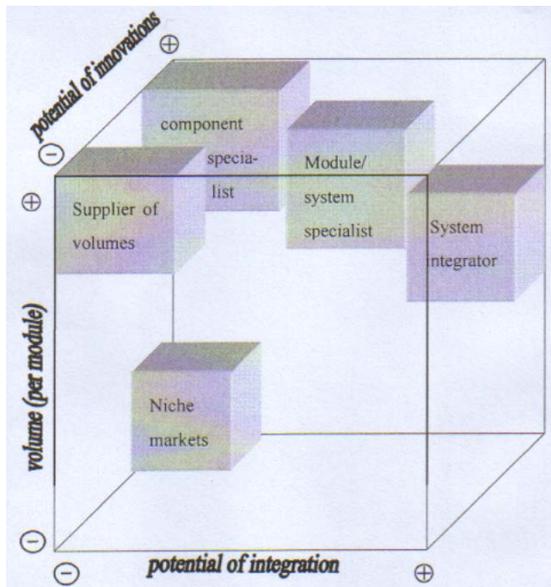


Figure 1 – Supplier Strategies

Instead of waiting for the OEM's demands it is important to initiate own innovations. There are suggestions that is a distinctive approach how the interaction and specialization between OEMs and suppliers is organized, using terms like „new network approach“ or „emerging network structures“. A lot of experts conclude that this kind of concept dominated in the late 1990s and may lead in the future to advantages over the „pyramid structure of hierarchical OEM – centered supplier relations found in Japan“. The US automotive industry with their OEM – owned but not OEM – centered mega suppliers seem to be in an intermediate position. But also in the European approach, the relationship between supplier and OEM remains augmented with conflict. OEMs are on the one hand meddling with the processes of their electronic systems suppliers on the other hand they are calling for them to take full responsibility

While the restructuring of the supply chain and related strategies are very much discussed with respect to the future of car manufacturing other, more radical changes which question the current product and production paradigm played a very little role. They largely seem to be limited to scientific and partly political debates under the heading „from the automotive to a mobility industry“. Such new concepts would very much concern the distribution chain and the relation to

the customers. New cooperation's to better integrate different modes of transport would emerge. Finally, instead of selling a car together with services a service (mobility) together with (the use of) cars would be sold. This would certainly have consequences for the design of cars (modularity, robustness, up-grad ability, etc.) as well as for the design of other modes of transport and the infrastructure, and in turn for the manufacturing process. Product and manufacturing technology may lose in importance for OEMs. Already, they are increasingly concerned with improving their competencies in services, distribution, or after sales support. They also face competition in this respect. However, these activities are still either confined to small market parts as car rental or meant to support traditional selling of cars. A shift towards „selling customized mobility“ which could very much improve sustainability of the transport sector and related industries is unlikely to emerge as a self-driven sector strategy but would require favorable political and societal framework conditions.

3. CONCLUSION

After having successfully weathered through such challenges as lean production or the wave of concentration, there are new challenges ahead. One of the major competitive issue in car manufacturing is for sure and restructuring of the supply chains.

The value-added process in the automotive sector today is global. Pyramidization of the supply chain and specialization of suppliers is taking place. However, contrary to former expectations regional supply clusters exist beside global sourcing. Rather than total dependencies of suppliers new balances of power and specific strategies on different stages of the supply chain seem to emerge. In the last years, the European automotive OEMs have other than their US and, even more, than their Japanese counterparts followed a strategy of networking with their (main) suppliers instead of applying hierarchical structures. Thus they have made use of productivity and innovation capacities with their value chain partners. Of course, this strategy is heightening the problem of integration of the different solutions in the car system.

This strategy seems to have been successful although it nibbles from the competencies of the OEMs and could endanger their competitive position, if taken to the extreme and, as long as competitiveness is not reinforced on the distribution and marketing side. From a macro-economic point of view, such networks of (relatively) strong independent companies could be more easily

accessible to appropriate technological progress from the outside.

The OEMs Policy should try to strengthen the ability and willingness for networking on the European level. Organizational as well as technological platforms for such networking could support European advantages and ease the integration. European diversity might at the same time prove an advantage in an automotive world which is increasingly characterized by complexity, variety and uncertainty. At the moment there is no consistent trend for the automotive industry, technology policy has to prepare for a diversity of concepts, partly complementing and partly contradicting each other. This situation might improve the chance of influencing trajectories in a way which is leading to better sustainability of the production and use of cars. The contest between the different concepts or approaches is by no means decided. Policy does not have to deal with a dominating trend which is difficult to be influenced or even (re-)directed.

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