PRODUCT DEVELOPMENT IN THE AUTOPARTS INDUSTRY

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ABSTRACT

The rapid and dynamic product innovation cycles, together with the change from manufacturer oriented to customer oriented market, determine the need for higher productivity, flexibility and most of all the reduction of time to market. On the other hand, the demand for shorter product life-cycles constraints the time available to develop new products or to reconfigure and refit the old ones to the new market requirements.

These issues gain a major importance when dealing with automotive industry. The increasing market pressure forces the establishment of new Vehicle Brand Owner’s strategies with great impact on the suppliers. Within these strategies emerges the outsourcing of the some activities classified as strategically forbidden a few years ago. A typical example is product development, which is becoming a responsibility of the Original Equipment Manufacturer’s suppliers facing them with huge challenges.

This paper, based on a diagnosis of the Portuguese autoparts industry and on global trends of the sector, launches some topics about product development strategies compatible and suitable to the dimension, culture and competencies of the national suppliers.

Introduction

In any business, in order to innovate it is necessary to master all the engineering and technology competencies, as well as have an excellent perception of the customer needs and market requirements. To simultaneously attain the required financial success, it is necessary to do it at a faster pace than the competition, and therefore reduce the lead-time, or the time to market.

The great changes happening in the automotive industry have been modifying the responsibility of each supply chain actor. As the responsibility for the manufacturing of autoparts, modules and systems proceeds from Original Equipment Manufacturers (OEM’s) to the actors below in the supply chain, the latter has been acquiring design, product and process engineering know-how, fundamental to develop new products.

The outsourcing is a recent strategy in the automotive industry. Due to the product complexity, the great number of systems and the wide range of technology involved, the outsourcing has become a vehicle brand owner’s (VBO’s) common strategy. The outsourcing made in the automotive industry is quite different from the carried out in the services sector. In the automotive industry this sort of relationship is almost a partnership, because it is made with a great deal of appendage. This kind of relationship is characterised by the combination of competencies, the share of risk and costs and scale economy effects.

Involving suppliers in the product development process allows OEM’s to reduce investment and costs. Further, OEM’s have access to a set of specific competencies (particularly in product optimisation through Design for Manufacturing competencies), and therefore they may concentrate their financial and human efforts in the activities that are really profitable and origin differentiation. At the same time, suppliers concentrate in the components and systems project, which indeed is their strongest knowledge.

Therefore, we can distinguish two major players in the product development process, the VBO’s and the components or systems suppliers. The former has a propensity to assume just the areas that can produce differentiation, like car concept and design, and the latter concentrates in components and systems development. This arrangement is becoming almost a rule in this industry, since it is favourable to the constructor and to the rest of the players, including the vehicle final user.

In this context, the autoparts companies, particularly the small and medium sized ones, are now facing their biggest challenge. The change required is in the opposite direction of their tradition, as they have been focused in manufacturing with few or null development activity. The major obstacle to pass round will be the necessary increment in terms of product engineering to start developing products, due to the massive investment required and its uncertain payback. These features are probably too heavy for some national companies.

This article is the result of several interviews with persons in different positions in the national automotive industry. All the positions in the national supply chain have been boarded but there
was a special focus on the systems manufacturers /integrators and component manufacturers. This special focus can be explained by the huge pressure on these supply chain positions owing to the global trends of the automotive industry.

The interviews were carried out with at least one top manager and with the responsible for the engineering department. In this way it was possible to identify the compatibility between the company strategy and the engineering point of view in the product development field.

**CONSTRUCTOR/SUPPLIER PRODUCT DEVELOPMENT INVOLVEMENT**

Although the automotive industry trends have been pushing the product development into the suppliers’ facilities, according to the interviews results there still exists three constructor/supplier sorts of involvement. So, we can distinguish:[1]

**In-house Product Development**

The internal product development is integrally made by the constructor, whereas manufacturing is a supplier responsibility. In this way the supplier solely develops his process know-how and lacks in product engineering. This posture makes the supplier very dependent on the constructor as the differentiation is obtained solely through price. Although this posture was generalised and encouraged a few years ago today it is responsible for those suppliers decline.

**External Product Development (black box)**

In this case, the constructor regards the work carried out by the supplier as a “black box”. Apart from the function to be fulfilled by the product or system, only the interfaces are specified. Therefore the supplier possesses all the development know-how required, previously owned by OEM’s, leaving solely the global specifications as a VBO’s responsibility. Although this sort of involvement appears to expose the constructor to the suppliers demands the constructor considers it the best position, as it reduces their product development risks and VBO’s concentrates on the top of the supply chain, therefore reducing the time to industrialisation.

**Product Development Partnership**

Although the external product development enables the utilization of the systems suppliers’ competencies, there is danger that only a sub-optimal overall system will be achieved, because in this kind of involvement not all degrees of freedom are reachable to the supplier. Consequently, the research and development competence that is required from external companies is being acquired to an increasing extent via development partnerships. Constructor and systems suppliers cooperate closely right from the early phases. The initial basis for the configuration of the development partnership is provided by the constructor breaking down the functions of the finished products into an organized structure, which enables the development work to be structured without restricting the scope of the various development tasks. Cooperation between partners in the course of product development is characterized by diverse contacts and synergies between the relevant employees of the companies involved in the partnership. The openness in all technical matters requires each partner’s contribution to be accepted and rewarded and is vital to the success of such cooperation. Further, it must be ensured that the partner companies are well matched in every respect. In addition to operational and strategic requirements, it is very important to ensure the “cultural fit”; i.e. the corporate cultures must be suited to one another.

According to the interviews, the Portuguese suppliers’ majority follows the product development programs of their customers. Unfortunately the involvement in most cases must be classified in the first involvement class (in-house Product Development). These suppliers generally follow the development process but start to take an active part in the prototyping phase frequently when the prototype is almost finalized. Their participation is usually through the manufacturing process knowledge, as long as their product know-how in terms of product requirements and specifications is reduced.

The few national companies that have the privilege to announce themselves as high technological component manufacturers develop their own products using the black box involvement.

Due to the actual situation many strategies may be foresee. According to the national situation diagnosed some strategies have been discussed.

**PRODUCT DEVELOPMENT SUPPLIER STRATEGY**

In general, the lower a supplier finds itself in the automotive industry, less opportunities it will have to capture value-added in the supply chain and therefore fewer opportunities to growth and lower the profit margins. In Portugal, due to the small size of the typical supplier, only a very small number (perhaps one or two) of those are likely to appear as full service systems integrators or remain as direct suppliers. So, the goal of the remainder will be to position themselves as high as possible on the supply chain.

The suppliers that remain at the bottom of the hierarchy will be producers of low-value-added items. Even the lowest-cost producers in this
category can expect thin margins and short-term contracts. During peak market demands the subcontracted levels will increase, whereas during downturns higher-level suppliers with excess capacity may pull the work-in-house.

Its current capabilities and position in the industry, the resources available, and the strategy business goals in terms of growth, will largely determine the options available to each supplier. Due to the increasing dynamic of the automotive industry, suppliers must identify without delay their current conditions and the options available to them in deciding where they want to be in the supply chain in five to ten years. There are basically three options:[4]

**Sell part or all the business** – This option is available to all sort of suppliers, but likely will be attractive to relatively few of them.

**Move up the hierarchy** – Although in a preliminary analysis people may think it is the most attractive strategy and it is reachable to every supplier, there are two moves most likely to be feasible: component manufacturer to subassembly manufacturer and systems manufacturer to systems integrator.

**Consolidate position at current level** – This option is likely to be attractive to subassembly and systems manufacturers that have the capabilities and resources to entrench themselves as low-cost suppliers of products that incorporate the technology at a world-in-class level.

**Sell the Business**

Selling the business will be a very attractive option for some suppliers and maybe the only option for others. As suppliers, especially the larger ones, position themselves to be global, full-service systems integrators they are adding capabilities by acquiring other, usually smaller suppliers. Subassembly and systems manufacturers that supply critical components and technology are especially in demand. Those that have well-established relationships with motor vehicle manufacturers, are well managed, and are financially sound are commanding premium prices from strategic investors, such as emerging systems integrators.

A key consideration for the acquiring supplier is the extent to which the ultimate customers, the motor vehicle manufacturers, wish to continue to do business with the supplier that is to be acquired, although not as a direct supplier. In the initial stage of the relationship between a systems integrator and the motor vehicle manufacturers, the latter usually specifies the indirect suppliers of key subassemblies and systems. As the relationship matures, they jointly select the indirect suppliers. In a mature relationship, the systems integrator has the sole responsibility for selecting indirect suppliers and for managing the entire supply chain. Since establishing itself as a credible systems integrator with one or more motor vehicle manufacturers is obviously the first critical step in the process, acquiring suppliers that are well-regarded by the VBO’s offers significant advantages beyond short term financial returns.

Direct suppliers, subassembly or systems manufacturers may find very attractive to sell the business if the following conditions are present:

- The supplier has determined that it must form a partnership with a systems integrator, but considers it would be a junior partner in the relationship due to the lead supplier’s size and/or capabilities, and that would be an uncomfortable position.

- The supplier does not have access to the resources necessary to become a systems integrator. In many cases the only feasible path to become a systems integrator is to acquire larger suppliers.

- The supplier has determined that it probably has access to the resources, but finds the prospect of attempting to transform itself into a systems integrator unattractive. Attempting to make the transformation from a successful but relatively small subassembly or systems manufacturer to a much-larger systems integrator is extremely risky.

The majority of Portuguese suppliers are privately owned and relatively small. After years of cost pressures and thin profit margins, some suppliers have not been able to make the investments in engineering, facilities, training, and other areas that are necessary to keep abreast of their competitors. Low profitability and under-investment, particularly in immaterial areas, have weakened the financial position of some suppliers to the point that they require a major infusion of cash in order to stay in business.

Some will find themselves in the circumstances described above, and decide to sell their companies over the next two to three years. The acquiring companies most likely will be multinational companies that are establishing themselves as global systems manufacturers.

Such companies generally are not very attractive to investors, but maybe attractive as strategic acquisitions by suppliers. They see value in the existing and potential future supply contracts that would come with the acquisition, and have the resources to turnaround the faltering operations of suppliers that they acquire.

**Move up the Hierarchy**

Until two to three years ago the primary success factors for most Portuguese suppliers were long-standing relationships with their customers, manufacturing capabilities and the ability to react quickly to meet customers’ needs.
Since then the list of success factors has grown rapidly to include product development and supply chain management capabilities. Whereas, in the past, a supplier could succeed by doing a few things well and reacting to its customers needs, in the future, successful suppliers, especially those that are planning to move up the supplier hierarchy, will have to do many things well and become more proactive in their relationships with their customers. In short, they will have to make fundamental changes to the way they do business.

Adding capabilities involves significant costs and risks to suppliers. The risks are due largely to the uncertainty that either margins or sales volumes will grow enough to recover the up-front costs of developing the needed capabilities. With the motor vehicle manufacturers demanding price cuts from their suppliers, higher margins to offset the costs of developing and maintaining additional capabilities can only be obtained through reducing costs in existing operations. Due to the steady state of the automotive industry growth the only suppliers that are going to achieve significant growth are those that are either capable of winning business away from other suppliers or expanding into new markets. Therefore, any investments in new capabilities must be focussed on reducing overall costs and increasing sales volume.

Enhancing their engineering capabilities is the costly improvement required to the suppliers that want to move up the supplier hierarchy. For component manufacturers that aspire to become subassembly manufacturers, the first step is to acquire the engineering talent and facilities to design, test and validate, and prototype the products that they previously built to blueprints and other specifications supplied by their customers. Component manufacturers typically spend little or nothing on product engineering and only a little more on manufacturing process development. The best subassembly manufacturers consistently spend about three percent of sales on engineering, most of it for product development.

For a component manufacturer, going from zero to three percent of sales for engineering costs is a huge leap. For many, three percent of sales exceed their average annual net profit. For the two to three years that it may take for a supplier to begin production of components that it has designed, there will not be any additional revenues to offset the costs of first building and then maintaining an engineering capability. The costs are an investment that must be funded out of the resources of the company. For companies with a strong financial situation, it maybe possible to fund the engineering costs internally, but at a substantial cost to shareholders’ equity. For companies with weak financial situation, the only options are to inject new equity into the company or take on new debt. In addition to acquiring an engineering capability, suppliers moving from being component manufacturers to subassembly manufacturers will have to assume responsibilities for additional manufacturing operations (e.g., machining, painting, assembly) and program management functions such as managing a supply chain and providing a higher level of customer service. Receiving compensation for the additional costs of providing these services is less of a challenge than funding up-front engineering costs since most of the costs will not be incurred until production begins. However, the supplier must become good enough at these new functions to be able to provide them cost-effectively: i.e., at less cost to the motor vehicle manufacturers.

It is only after a subassembly manufacturer has acquired the necessary engineering, program management and other capabilities, as outlined above, that it can realistically expect to increase its sales volume. Displacing existing suppliers for models that are in production is extremely difficult and in most of the cases it is not financially rewarding. The best opportunities for new business are to win supply contracts for new models. However, only the best-qualified subassembly manufacturers will be invited to participate in new model programs by the VBO’s and, increasingly, systems integrators.

A component manufacturer’s success in making the transition to a subassembly supplier will be measured by the extent to which it emerges as a supplier of lower-cost higher-technology sub-assemblies than its competitors. Existing direct suppliers that succeed on these criteria and, in the process, strengthen the relationships with their customers can expect to remain in the automotive supply chain, but, in the longer term, not as direct suppliers to the motor vehicle manufacturers.

**Consolidate Position at Current Level**

In contrast to the substantial changes that the other options entail, the best strategy for some Portuguese suppliers is to stick with what they do best. This strategy does not imply stasis. Suppliers will have to continue to improve their core capabilities and, in almost all cases, will have to shift their customer focus from motor vehicle manufacturers to systems integrators. The suppliers that are most likely to succeed at this strategy are those that are already good at their area. They are currently meeting the motor vehicle manufacturers’ targets for cost reduction, quality, and service. Most of the direct suppliers that meet these criteria and are otherwise well regarded by their customers will remain in the supply chain, but not necessarily as direct suppliers.

In the longer term, suppliers will assume more of the responsibilities for the design of the vehicle manufacturers’ core systems. The motor vehicle manufacturers will certainly keep most of the body styling likely in-house, but responsibility for
structural design may be transferred to a supplier of essentially all of the body panels. They will do this by acquiring additional design and program management capabilities along the way and growing so that they have the size and financial resources to take on the additional responsibilities when the time comes.

As noted above, in the initial stage of the relationship between a systems integrator and the motor vehicle manufacturers, the latter usually specifies the indirect suppliers of key subassemblies and systems. Therefore, as the OEM’s purchase more components, subassemblies, and systems through systems integrators, the suppliers that previously supplied these items directly will have some protection against being squeezed out by systems integrators. Their biggest challenge will be to establish long-term relationships with a new customer base, consisting mainly of systems integrators.

Strategies for Small or Medium Size Portuguese Suppliers

Considering the small dimension of the Portuguese suppliers’ majority, many of those will choose to consolidate their position at current level. Although this strategy aims strengthening the company position, due to the supplier chain reconfiguration the companies which adopt this strategy probably will weakness their position as OEM’s suppliers. In fact, this tendency can be already witnessed.

These companies should turn the global systems manufacturers presence into an opportunity to take advantage of their established product development methods and their large experience in their core activities. The systems manufacturers are also interested in suppliers’ participation, as a column to their increasing product development. In fact, there are systems manufacturers doing product development in Portugal, usually parts of the systems integrated, and their success also depends on the support given by lower supply chain players. The areas more likely to be sub-contracted will be detailed engineering project, involving for instance structural analyses through finite elements, and functional and technical prototyping. In short, process specialists must position themselves near the global systems manufacturers to assume the additional responsibilities in the product development field instead of simply contribute through their competencies in Design for Manufacturing.

Obviously, this is a learning process that must be developed over time and where, not only the right technological and management competencies must be created, but also an acculturation process between companies is necessary. To accomplish this aim it is necessary to create and maintain communication mechanisms based on personal and technical aspects.

The small suppliers must have a clear vision of their customer’s needs and future prospects not only at short term, but also on long-term perspective. These ought to make their own strategies and consider materialise them with long term formal or informal partnerships with other players, maybe competitors - to achieve the critical dimension and to share risks - or complementary companies - to include complementary technologies and deliver products with an higher added value - or even technological institutions - to have access to new technological developments and higher level of engineering competencies, not possible to maintain in house.

Conclusions

In the past, a supplier could succeed by doing a few things well and reacting to its customers needs, but in the future successful suppliers will have to do many things well and become more proactive in their customers’ relationships. Responsibility is synonym of risks but also means higher profit margins. So, this new posture must be adopted if Portuguese suppliers want to survive to the challenges of this new automotive industry.

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Keywords

Product Development, Collaborative Product Development, Supply Chain Reconfiguration, Portuguese Autoparts Industry

Bibliography