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Full Service Vehicle Manufacturing

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Abstract

The literature and theory of supplier involvement in the design and manufacture of products in the automotive sector has not kept pace with developments in the industry. We explore the previously undocumented emergence of full service vehicle manufacturers (FSV) which produce finished products for the large manufacturers. The emergence of FSVs is explained using transaction cost ideas as they do not carry the costs of developing engines and power trains and so have been competitive in traditionally marginal markets. FSVs have recently seen a shakeout with some developing whilst others have faltered, and we explain the differing success through a changing focus of capability from design to production once vehicles have become established in the market.

Keywords: Collaborative product design, product development, manufacturing, supplier involvement, automotive industry

INTRODUCTION

Following the Dell model, producers of complex manufactured goods have tried to abandon vertically integrated production, increasing the scale and scope of their outsourcing [1, 2]. Outsourcing lowers production costs and helps rationalise operations, promoting a focus on the core business, and leverages external technological expertise [3]. The shift towards outsourcing is coupled with the development of modular products and processes, allowing design and production decomposition into modular tasks that can be assigned to different actors or different external providers [4, 5].

This trait is even evident in the auto industry but is one which has yet to be fully described or explored. Most European automotive companies, such as BMW, Fiat, Mercedes, Volkswagen and Porsche, in addition to the likes of Chrysler and Ford, outsource the manufacturing and assembly of some of their cars to full service vehicle suppliers (FSV) – firms whose business is to design, develop and produce entire vehicles on behalf of lead producers. This model appears to be missing in the literature as for example, Zhang *et. al.*'s recent analysis of supplier involvement in new product development in the car industry does not identify this type of total design and build sub-contracting [6].

This paper describes the activities of the FSVs and seeks to explain some of the reasons for their emergence to a position where they are actively involved in the industry shakeout following the post 2009 financial crisis. This is carried out by initially thinking in terms of the cost structures of the industry and also by exploring the changing needs of the lead manufacturers as their niche FSV-derived products become established.

The next section of the paper reviews the literature on supplier involvement, capabilities and transaction costs, and is followed by a description of the activities of some FSVs with a discussion which attempts to explain their emergence in terms of cost structures. We finish with an explanation of the possible future development of this aspect of the auto industry.

LITERATURE REVIEW

Brown and Eisenhardt [7] review the features of success in new product development and, amongst internal and market aspects, identify the importance of supplier involvement, as developed by Clark and Fujimoto, as critical [8]. This has seen an increased attention in both practice and theory [9-11]. The core theme of the literature concerns access and leverage of supplier technologies and capabilities to improve the effectiveness and efficiency of new product development. The literature covers most aspects of the life cycle including early stage involvement and the way some firms benefit from supplier suggestions and the outsourcing of whole modules [8, 12, 13]. The suppliers have also been studied in terms of their continued involvement in developing the product and also the commercialisation of the finished products [14-16]. However, there is some evidence that supplier involvement may not work as intended due to a number of

factors including imbalanced expectations or power and a lack of commitment from either party [17-20]. Indeed, in some industries the contract manufacturers have become the key holders of technology and can dictate the terms of the relationship wielding great power as a result [21, 22].

The debate on supplier roles is not new as it resets the old “make or buy” dilemma. As Williamson pointed out, not all transactions can be regulated by the market and completed on the basis of the information that price transmits [23, 24]. The supply issue has also been tackled by scholars from the resource-based view of the firm. Starting from the idea that a firm is a collection of resources or capabilities, and that the latter evolve, these scholars questioned the relevance of make or buy for the acquisition or retention of core capabilities [25]. Recently the two literature streams have converged, pointing out that outsourcing decisions are related to the resources of firms, their capabilities, the transactions involved, and especially to their intended strategy [24, 26]. Most of the contemporary literature on outsourcing and inter-firm relations is based on, or at least draws from, the insights of the scholars of transaction costs and the capabilities of the firm – it questions the nature of the transactions that firms internalise or outsource, and the implications of this “make or buy” for their resources, capabilities, and strategies. We feel these views are key in understanding the rise of FSVs and also useful in predicting their future.

METHODOLOGY

As befits an explorative investigation of a relatively new and under investigated topic, we explore the FSVs and their business using a comparative case based approach [27, 28]. This provides a rich source of data and yet is not constrained by expectations or pre-formed questions. The data on the FSVs was initially gathered from company websites, company publications, and Italian, French, and German automotive industry organizations. This initial investigation was extended with interviews including one CEO and two product managers interviewed from three European FSVs, and further interviews with managers in two OEMs, one provider of product development services, and a senior industry consultant.

RESULTS

FSVs are firms that supply OEMs with a “full service” – they develop, engineer and manufacture vehicles. They specialise in niche vehicles, such as coupes, convertibles, high performance versions of volume cars, and 4x4s. In Europe there are six well-known FSVs: Bertone, Magna Steyr, Pininfarina, Williem Karmann, and Valmet Automotive. Table 1 summarises their development whilst Table 2 outlines their expertise. Whilst FSV may represent a new role in the market, they are not new firms as the following description shows.

Steyr was founded in the 1860s and manufactured military vehicles for the Hapsburg government before 1918. During the 1960s it began manufacturing a variety of products – vans, scooters, bicycles – under the Puch name as well as Fiat 500s under a licensing agreement. In the 1970s production shifted to off road vehicles. Its first subcontracting FSV product was the Mercedes G class co-developed with Mercedes and exploiting Steyr’s off road expertise and 4x4 transmission technologies. The G Class has been produced in the Steyr plant in Austria since 1979. Steyr is the largest FSV in the world, with sales and production three times that of its next competitor and was acquired by Magna in 1998, changing its name to Magna Steyr.

Expansion at Steyr in the 1990s happened as OEMs moved towards more outsourcing and included Chrysler subcontracted production of Jeep Grand Cherokee and the C300 saloon. Steyer also produce the 4x4 sedan E class 4 Matic and the luxury SUV M Class for Mercedes. Steyr is also linked to BMW through production of the X3 with high production runs resulting from its success. Steyr also recently started working with Saab to produce the 9-3 convertible, a move which broke a long term link by Saab to its traditional contract manufacturer Valmet. Thus Magna Steyr has developed new expertise in relatively high volume assembly lines and, in producing over 200,000 units per year, is significantly larger than some OEMs.

Pininfarina and Bertone originally started as design and manufacturing service providers of unibody shells which were then mated to OEM manufactured chassis. With the advent of the monocoque (where the body itself carries the loads and power train of the vehicle without an independent structural chassis) the firms developed expertise in full body design and also vehicle manufacturing, as well as continuing the niche, unibody work. Both Bertone and Pininfarina are well known as designers of supercars and classic Italian racing cars. Bertone designed, co-developed and built the body of the Lancia Stratos, the first mid-engine rally car, which dominated the sport in the 1970s. Pininfarina designed, co-developed and produced the Ferrari

Testarossa, one the best selling Ferraris of all time. In addition, OEMs such as Ford and Peugeot often mention that their cars were designed by Pininfarina and Bertone in an attempt to exploit brand value.

TABLE 1.
EUROPEAN FSV FIRMS

FSV	Brands made	Focus	Employees	Production per year
Bertone	Citroen, Fiat, Opel	Coupes	1,200	15,000 (1992-2006)
Heuliez	Peugeot, Opel	Coupes, open roof models	1,100	2,400 (1992-2006)
Magna Steyr	BMW, Chrysler, Jeep, Mercedes, Saab	4x4, coupes	9,500 in Austria	130,000 (1998-2006) 220.000 (2004-2007)
Pininfarina	Alfa Romeo, Ferrari, Volvo, Mitsubishi, Peugeot, Citroen	Coupes, open roof models	> 3,000	20,000 (1992-2007)
Valmet Automotive	Volvo, Porsche	Coupes, open roof models	800	10,500 (1991-2005)
Williem Karmann	Volkswagen, Ford, Renault, Mercedes, Kia, Chrysler, Jaguar, Audi	Coupes, open roof models	5,000 in Germany	48,000 (1990-2004) 15.000 (2004-2008)

Like its Italian rivals, French Heuliez also started as a coach, or car body, producer before the introduction of monocoques. Founded in the 1920s it was exclusively a Citroen subcontractor until 1985, manufacturing station wagon and retractable roof versions of specific vehicles mainly for the French market. Since 2004 it has produced Opel's the Tigra Twin Top which it also developed. After recent problems, Heuliez is now 60% owned by the Indian group Argentum and is working extensively on electric vehicles for the mass market.

Williem Karmann has a similar origin to Pininfarina and Bertone as it started in the 1900s as a designer and builder of vehicle bodies. After WWII, VW outsourced convertible Beetle production to Karmann which developed expertise in retractable roofs. One famous project was the VW Karmann Ghia, a Beetle-based coupe, producing more than 300,000 units between 1955 and 1974. Since then Karmann has operated in two main areas, coupes and convertibles. It developed and produced coupes for VW (the Scirocco I and II) and

Ford (Mercur) as well as convertibles for VW, Ford, Renault, and Mercedes. Since the 1990s Karman entered a new market co-developing and producing the Kia Sportage, a small SUV. In the same period it also diversified its client base making coupes for Mercedes (CLK coupe) and Chrysler (Crossfire roadster) as well as convertibles for Jaguar (XK8), Audi (A4 convertible), and Chrysler (Crossfire convertible).

Valmet-Saab was founded in the 1960s with the support of the Finnish government to assemble Saab vehicles for the local market. Later it also assembled PSA, GM, and Avtovaz vehicles for the Finnish market which had strong import restrictions. Opening the Finnish market to competition led to independence from Saab in 1992 and the subsequent manufacturer of cars for the global rather than domestic market, including Saab convertibles and Opel Calibras. In 1997 Valmet co-developed and produced the Porsche Boxter and by 2008 had produced 200,000 Boxter, new Boxter, and Cayman models for Porsche.

The description of the FSVs above is in itself interesting, but the next section identifies and develops the themes by exploring some reasons for their rise using the transaction cost framework.

DISCUSSION

The use of FSVs is an extreme form of outsourcing. It is a hybrid form of industrial organisation, which combines joint efforts in developing a modular product; with the outsourcing of specific niche manufacturing processes.

Table 2 shows the FSV firms and the definitions of their business they provide on their websites. All FSVs specify that they can provide a packaged product development and manufacturing service, but most of them also mention that they specialise in niche vehicles or low volume production. Whilst PC manufacturers use subcontractors for the whole range of goods they produce, OEMs use FSV suppliers only in specific product niches, such as convertibles and coupes and only where the FSV may have more product development and manufacturing competence (see Table 1 and Table 2). For example, Pininfarina has built convertibles for Fiat, Peugeot, Ferrari, Maserati, and other brands for over fifty years. Its clients on the other hand have manufactured only a fraction of their own convertible vehicles. Currently, there is no evidence of larger firms outsourcing the production of mainstream models, or which generate high sales.

TABLE 2.
FSV FIRM EXPERTISE

FSV	Business Description
Bertone	<ul style="list-style-type: none"> • Carrozzeria Bertone, the production centre of the Bertone Group, is optimised to build <u>niche vehicles</u> by its exceptional operating flexibility • Over its 90-year history Carrozzeria Bertone has been leader in a radical change: the transformation from traditional "coachbuilder" to full-cycle manufacturer at the service of clients • Carrozzeria Bertone does the <u>product</u> and <u>process engineering</u> for all of its products and handles the entire manufacturing cycle
Heuliez	<ul style="list-style-type: none"> • French Heuliez Group is specialized in the turnkey development and production of <u>niche vehicles</u>
Karmann	<ul style="list-style-type: none"> • Karmann is a full-service-vehicle-supplier • For more than 100 years, our overall knowledge from modules to complete vehicles has made us partners with the great names in the industry • We are a long established service provider for the automobile industry, specialising in the development and manufacture of a range of <u>niche vehicles</u>, convertible tops, tooling and production systems. Our experience with <u>low-volume</u> and <u>niche vehicle</u> production provides us with extensive knowledge, which guarantees flexible and economical production solutions
Magna Steyr	<ul style="list-style-type: none"> • We are and will be the worldwide leading, brand-independent engineering and manufacturing partner for OEMs and provider of innovative solutions for mobility in the future • Magna Steyr's range of services comprises the whole spectrum of processes within the automotive industry, from development to production, from the concept to the assembled vehicle • The flexibility of Magna Steyr's manufacturing system enables us to cover a wide range of services from <u>extra low volume production</u> and from <u>peak shaving</u> to <u>phase in and phase out production</u>
Pininfarina	<ul style="list-style-type: none"> • Pininfarina is now one of the major suppliers of <u>design</u>, product and process engineering and manufacturing of <u>niche vehicles</u> on the automotive scene • Pininfarina is a leader in the production of <u>niche vehicles</u>
Valmet	<ul style="list-style-type: none"> • Valmet Automotive <u>is a service provider</u> • We offer complete vehicle projects from product development to series production tailored according to specific customer expectations

Transaction cost economics provides an important explanation as to why some transactions are regulated by markets, others by hierarchy. Firms internalise and regulate hierarchically some of the transactions necessary to transform inputs into the goods that they intend to sell. When transactions are complex, it is difficult to

determine exactly the nature of contracts as conditions may change whilst the transaction is carried out. Therefore, in order to complete the transaction, it may be necessary to continue exchanging information which may be difficult to codify and formalise in a contract [23, 29]. FSVs have benefited from the cost structures of the industry as their rise saw them effectively developing vehicles without paying for the expensive power trains or the engineering of major and minor components. This reduced the breakeven volumes to the small numbers they have made a living from.

Times, however, seem to be changing for FSVs, along with the rest of the industry. Since 2006 several FSVs stopped production altogether with one of them declaring bankruptcy, showing that the trend towards the outsourcing of production in the automotive industry is all but clear cut. FSVs normally specialise in the production of low volume niche cars, which cannot be economically co-produced on generic assembly lines. They also tend to serve several OEMs. As such the FSV business model depends on the renewal of outsourcing production contracts from existing clients, or on winning contracts for the design and/or production of new niche models.

Economic and competitive pressures have made the niche markets less attractive to OEMs and this has had a major impact on FSVs. After 2004, Bertone, Karmann and Heuliez failed to win new contracts for the production of open roof models from Fiat, VW and PSA respectively. As a result they found themselves with idle capacity and high variable costs. They responded by downsizing, temporarily closing their factories and asking for government support. Valmet's contract for the production of Porsche cars will expire in 2009 after which the Finnish FSV plans a shift to the production of electric cars.

These events seem to show that the FSV business model may be running into difficulties. The economies of scale of FSVs are very limited, and they cannot adjust easily to market fluctuations because their production lines cannot be used simultaneously to assemble finished or semi-finished vehicles for different lead firms. However, whilst Bertone, Karmann and Heuliez were facing a dramatic crisis, Magna Steyr won an unprecedented number of contracts from lead firms reaching production volumes of over 200,000 cars per year with models that range from saloons (the Chrysler 300), to SUVs (BMW X3 and Mercedes M) and sporty convertibles (Chrysler crossfire). Magna Steyr managed to win the contract for the production of the Porsche Boxter and Cayman from Valmet and has new or future contracts for Aston Martin, Peugeot and

Mini. The economic crisis of 2009 even saw Magna Steyr as the main bidder for GM's European operations (Opel-Vauxhall), until the Detroit giant backed away from disposing of its assets so directly late in the year. Pininfarina has also been successful recently and added production capacity in response to contracts from Alfa Romeo, Ford, Mitsubishi and Volvo.

Clearly therefore, FSVs are not acting in the same way as the component/module specialists seen in the computer industry. Instead of offering relatively interchangeable modules and seeking to win business by offering superior technological solutions, the FSVs develop their products with the OEMs based on the original platforms. They do however have some similarities with contract manufacturers as once the design has been established there can be a shift of production between the FSVs. Here manufacturing rather than design expertise plays a more important role. This represents the changing needs of the OEMs away from design to production expertise as predicted by the RBV arguments presented in the literature review.

Overall the production of cars outsourced to FSVs has not decreased recently and may indeed increase in the years to come, but there has been a concentration of the outsourcing to fewer FSVs, namely Magna Steyr and Pininfarina. The recent events show FSVs seeking to diversify their range of clients and specialisation, whilst the crisis that some of them are facing may be only a result of the generalised problems of excess capacity and high costs that the automotive industry is going through.

CONCLUSION

The literature and theory of supplier involvement in the design and manufacture of products in the automotive sector has not kept pace with developments in the industry with regard to full service vehicle manufacturers. This paper has explored the growing number of FSVs which design and produce finished products for the large manufacturers.

The emergence of FSVs themselves represents a convergence of players from several backgrounds building on strengths in styling, design, component supply and contract manufacturing. There is some value in using notions of capability to examine FSVs, but we feel the phenomenon can best be explained through the lens of transaction cost economics and an understanding of the cost base in auto manufacturing. The FSVs do not carry the costs of developing engines and power trains, or sales, after sales and distribution, and so their

products can be competitive in smaller market segments than the main production lines of the OEMs. However, the tightening of economic situations has seen a similar shake out to that of the main auto industry players with several FSVs facing major problems and the others picking up the remaining contracts. Where this will lead is unclear, particularly given the current turmoil in the industry, but it is evident that the larger FSVs have enough expertise and weight to consider themselves part of the main stream rather than as just an offshoot.

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