

Structure and transformation of the Italian car styling supply chain

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ABSTRACT: In a short space of time the car styling supply chain has undergone deep changes, which are being amplified by the current economic-financial crisis. The digitalisation of production and the transformation of supply links have modified the competitive positioning of companies along the supply chain.

In the Turin area the design-product-service relationships have been strengthened and have manifestly acquired the size and complexity of a system, with a high concentration of designers working in the styling industry and a continuous transfer of know-how from the motor vehicle sector to related and specialised sectors.

The main objective of this paper is to analyse Turin's companies specialised in car styling, in order to highlight their peculiar features and operating strategies. As a matter of fact the Turin car styling supply chain quite accounts for the entire Italian sector.

KEYWORDS: Car styling supply chain, Design-driven innovation theory, Coachbuilders, SWOT analysis

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1. INTRODUCTION

Since the mid 1990s the acceleration of innovation cycles has brought about deep changes affecting the actors and processes of product development structures in the automotive companies.

One of the main challenges carmakers have had to face has been that of boosting product development productivity in terms of time to market and number of different models. This strategic choice has led carmakers to increase investments in the development of new vehicles; to intensify collaborations with design and engineering firms and with knowledge intensive business services; and, lastly, to strengthen and reorganise internal design centres.

Over time, the supply links within the car industry have evolved into a more complex division of labour than that based on the simple separation between manufacturers, acting as chassis and engine specialists, and coachbuilders, *i.e.* bodywork style specialists. The choice of a design firm by a carmaker is more and more based on the carmaker's trust in the supplier. Design firms are not mere suppliers, selected on the basis of the prices they offer, but partners with which a long-term co-designing relationship is established. Within this context of deep transformations, the adoption of digital techniques has brought about a greater parcelling out of the production process. Hence, through the years, the car styling supply chain has come to include, on one hand, firms capable of providing not only design activities but also specific additional services and, on the other hand, a large number of companies with high specialisation along the value chain.

The economic-financial crisis has brought about changes in the strategic positioning of car design. On one hand, there is a continuous process of takeovers and alliances, which the current crisis is strengthening, while, on the other hand, the restructuring also involves the internal processes of end manufacturers, which are more and more geared towards the insourcing of production and designing activities in comparison to the past.

Differently from other international contexts, the development of the automotive sector in and

around Turin has followed two different paths, whose reciprocal intersecting has deeply characterised and marked the surrounding areas, inevitably granting the city international fame.

Turin's vocation for the metal working industry has found its most effective application in the production of motor vehicles. Its craftsmen have managed to cater both for mass production and for specific needs determined by the demand for unique or prototype items. Several areas around the world have a vocation for the automotive sector but only Turin displays an entrepreneurial network that is so rich in top-quality and highly competitive production methodologies and creative skills. This complex industrial and service system styles, designs, develops and manufactures cars and it involves process managers, designers, technologists, as well as model makers.

This is the reason why, when talking about the automotive sector, it is possible to regard Turin as a wide vehicle production district and, specifically, the Turin metropolitan area as a key centre for designing processes. Design could be the true value added to the product, capable of mirroring and fully expressing the Italian genius, which strives to harmonise beauty and functionality.

This state of affairs has been further reinforced by a very thick network of relations and contacts that escape any cataloguing attempt and that branch out across the international markets, reaching as far as the rest of Europe, the Middle East and, to a lesser extent, the United States.

As a consequence of the deep changes that have occurred in the structure of the value chain, the car styling companies in Turin, and above all the independent coachbuilders, has been the object of growing attention. Following the early signs of crisis displayed by a number of large coachbuilders in Turin, the aim of this paper is to analyse the peculiar features of the Italian car styling industry and, more precisely, the creation and modelling of car style.

This paper consists of six chapters, in addition to this introduction and a conclusion. Chapter two provides an overview of the activities carried out respectively by car style designers and innovators from a strategic point

of view, investigating the two-way relation between design and innovation. Chapter three describes the methods adopted in selecting and analysing the firms. Chapters four and five examine respectively the reorganisation process and the production structure of the car styling industry, while chapter six focuses on the impact generated by the current crisis. Chapter seven is specifically dedicated to the so-called coachbuilders, which, along the supply chain, have been affected the most by the current transformation process.

Lastly, I wish to thank the Industry Department of the Office for Productive Activities of the Region of Piedmont for financing and supporting this research project which, in our opinion, not only focuses on a field little investigated within the automotive supply chain but particularly widespread in Piedmont but can also promote the implementation of targeted industrial policies.

2. THE STRATEGIC ROLE OF DESIGN

In the last few years a growing number of researches and empirical studies have acknowledged the key role of design in the creation of innovative products and services. The contribution of design can significantly increase the value of goods, boost turnover, and open up new markets (Roy and Reidel, 1996; Walsh, 1996).

Nevertheless, economic and managerial literature has only recently taken into account innovation paths based on design. Approximately until the late 1980s, technological innovation and aesthetical innovation were kept separate both in theory and in practice.

The reason behind the marginal role assigned to design within theoretical speculation lies in its distinctive features and, in particular, in the impossibility to categorise it within an industrial world made of scientific knowledge, mass markets, standardisation, and economies of scale (Micelli and Finotto, 2005). In fact, the typical model used in economic literature to describe the dynamics of innovation mainly focuses on the process of creation, management, and

enhancement of scientific and technological knowledge, in which innovation processes generally flow from basic research to product launch, going through applied and pre-competitive research (Malerba, 2000).

According to the interpretation methods of *Complementary Innovation* and *Swarming Secondary Innovations*, design is, as a general rule, seen as an incremental and not as a radical innovation factor. At first glance, this distinction might seem incontrovertible, in particular when focusing exclusively on the innovative content and not on the merchandise solutions provided by new products; however, just to quote two recent examples, MP3 players and pen drives are to the eyes of many radical rather than incremental innovations. Conversely, this distinction might be misleading when design is considered as a secondary or complementary competitive factor, due to the fact that the innovative core is believed to lie solely in technological contents.

According to the framework developed by Oakley (1990) within *Complementary Innovation*, it is crucial to distinguish between designed innovations and basic innovations, since the former are basically factors which add value to the latter, in order to increase their usefulness. In this sense, design is reduced to its mere style content and takes on the limited role of complementary element (Chamber of Commerce of Turin, 2007).

Conversely, according to the *Swarming Secondary Innovations* approach, the value supplied by design is linked to progressive improvement and to the differentiation of existing products, to price competition through efficient use of materials, as well as to the improvement of production processes. Design essentially plays its role in the relationship with the market, as an element that differentiates products and continuously adjusts to the changeable taste of different consumer targets. According to this approach, design can improve the quality of certain products, reducing enterprise risk in terms of lower investments in development, reduced times for product launch, lower financial resources for covering expenses, lower competitive risks (Walsh, 1996), and lower-profile technical skills (Olson *et al.*, 2000).

In both lines of thought, design plays no part in managerial and economic theory, essentially because it represents the typical strategic lever of market niches, where companies are few in numbers and operate using almost handicraft-like production methods, which are scarcely representative of national economic systems and not very relevant from the point of view of quantity. Designer items represent an exception to mass products and, in them, form and aesthetics prevail over the functionality and usefulness of the object.

Until the end of the 1980s this gap was particularly evident in the Italian context (De Fusco, 1985). The Italian leadership in a number of sophisticated market niches failed to integrate with the industrial system, mainly focused on mass production.

According to Micelli and Finotto (2005), to some extent the gap between production and design still persists and is continuously caused by two factors: the first issue regards the lack of attention by institutions to design as a crucial strategic lever for Made in Italy products; the second aspect is linked to the will of an elite group of designers to maintain their artistic specificity as well as their pedagogical vocation as keepers of good taste. In the past, these limitations, which have now partially ceased to exist, were responsible for a shortage of design schools and specific curricula outside of the applied arts framework (Penati, 2003).

In spite of these problematic issues, one of the peculiar features of the *Made in Italy* industry has been that of creating, through non-formalised and often accidental processes, products having a high aesthetic value even in less exclusive sectors, thanks to a culture of taste which is particularly widespread among several small and medium enterprises as well as among consumers.

As mentioned above, since the late 1980s the marginality of design issues in relation to studies on innovation has gradually decreased as a consequence of the progressive metamorphosis of consumer behaviour models. A product's competitive advantage lies less and less in its technology and functionality. Consumers have become customers and they now have an active role in the definition of product content.

The transformation of market competition rules and the commercial success of several products, whose radical innovative value is only superficial, have led to a new interpretation of the innovation process.

The core of the *Design-driven* innovation theory (Zurlo *et al.*, 2002), also called *Design Inspired* (Utterback *et al.*, 2006), is that radical innovations arise through both technological innovations and design, thanks to the creation or transformation of product meanings in terms of worth, personality, identity, and status associated with the product itself (Verganti, 2003). Design too is capable of lending products a substantial competitive value, similar to that generated by technological innovation.

A number of organisational requirements are necessary for *Design-driven* innovation to actually be accomplished: the first condition is the involvement of design skills prior to the process by which the product is conceived and developed, using design strategically and not only from the point of view of product styling; the second aspect concerns the balancing of internal and external designing skills in order to outline all the possible future socio-cultural scenarios and possibly to try and influence them through the creation of new meanings associated with the products.

Within this interpretative context, the Italian design tradition, although it is not considered very business oriented, represents very valuable capital that can be profitably spent in the new competitive scenario. Four possible ways of resorting to design as innovative lever can be identified (Micelli and Finotto, 2005):

- Design as exclusiveness and aesthetics. These companies can be defined as design-based, since they have turned design into their primary asset and base all their strategic decisions on this competitive lever.
- Design as ergonomics and aesthetics. These companies have distinguished themselves for their attention to product functionality and have invested considerable sums in ergonomics as a source of innovation, rejecting preventing aesthetic aspects as purely ornamental.
- Design as creative integration of technology. These companies tend to incorporate state-of-the-art technologies into design products used

in everyday life, which are destined to become some sort of commodity.

- Design as aesthetic recontextualisation of traditional products. These companies tend to join the world of shapes to that of meanings and experiences.

The contrast between technological innovation and *Design-driven* innovation takes on distinctive traits within the automotive sector.

The industrial conception of style originated in the United States before the Second World War with Alfred Sloan, who introduced the concept of planned obsolescence to General Motors, foreseeing that style would soon become one of the most important and aggressive elements in sales promotion. The first automotive industry style centres were set up with the purpose of planning the aesthetic makeover of products.

Every one or two years each model underwent a facelift and restyling and every five years, regardless of the amount of sales, each model was replaced. If on one hand this system enabled General Motors to become one of the biggest and most profitable industrial enterprises, on the other hand so many frequent modifications led to the commercial launch of quite a few conceptual degenerations.

Conversely, European manufacturers focused on a model's long lifespan as a success factor, thanks to innovative technical and aesthetic content. Some examples are particularly significant: the first Mini Minor was launched in 1959 and its production continued until 2000; the first Fiat Panda was produced for over 20 years; the Porsche 911, which was manufactured from 1963 to 1998, achieved higher sales than any other later model and reached its peak of success in 1997.

In the 1970s the oil crises forced also the United States to rethink cars in a more rational and functional way. Sterile styling gave way to design, *i.e.* to approaching the styling of a car's shape with much more awareness. Those years saw the spreading of concepts such as accessibility, aerodynamics, and ergonomics (Pininfarina, 2003).

The changes currently affecting the

automotive sector are not only fast but they also require a strong innovative contribution, in which technology and design go hand in hand. Building a new model entails substantial investments, which have a marked influence on the selling price. Carrying out comparative design studies to provide a wider range of choices costs relatively little when compared to the general investment costs. This is one of the reasons why, when major carmakers design new models, they also involve independent design firms, in order to have a large selection of options to choose from.

With the purpose of reducing costs, carmakers have rationalised internal projects so that they can use one chassis for different models, thus pursuing economies of scale more effectively. In some cases, a maximum of eight vehicle models have been produced using the same platform. The aspect that mostly differentiates one model from the next is design and style has probably become the most distinctive element of brand image.

Within this context, the contribution of stylists has proved to be very important since it has managed, though partially, to transform cars by bringing out some unexpressed functionalities and by actually creating new market segments, whose importance, however, is still limited.

Given the complexity of cars as products, they display all the previously mentioned innovative levers of the *Design-driven* theory.

Suffice it to think of MPVs, which were crossed with station wagons, giving rise (design as ergonomics and aesthetics) to either multi utility vehicles, when the main purpose is carrying passengers, or to multi-purpose vehicles, when the main purpose is carrying things, or to leisure activity vehicles, if the required size and quality are lower. MPVs were also crossed with all-terrain vehicles, spawning the so-called sport utility vehicles and the cheaper crossovers (design as creative integration of technology).

Around the same time, microcars and citycars appeared on the market; some of them were innovative, others essentially consisted in revamping previous successful models (design as aesthetic recontextualisation of traditional

products), and they met with wide popular acclaim. Tuning activities should also be mentioned: they have evolved from individual handmade modifications to industrialised large-scale customisation and have led to the production of premium and luxury cars (design as exclusiveness and aesthetics), on which most of the research concerning highly innovative stylistic forms is actually concentrated.

The new frontier of car design is represented by new types of propulsion, in particular electric, total or hybrid, which require a different layout and new vehicle architecture and simultaneously involve all the innovative levers of design (design as creative integration of technology).

Within car styling activities, professional expertise and skill requirements are abundant and only a few companies are capable of fulfilling all of them in a comprehensive and constant manner. Concept design, virtual and physical modelling represent the core business of car styling, while product and process engineering and prototyping are more directly connected with product development. Most companies tend to focus on just some of these requirements, at times spawning upstream or downstream hybridisations along the car supply chain up to production.

3. SELECTION OF FIRMS AND INVESTIGATION METHODOLOGY

The first step in compiling the sample of companies from Turin specialising in car styling was examining the list of the Italian Association of Automotive Industry (ANFIA). This list was integrated with the survey promoted by the Chamber of Commerce of Turin (2007), with databanks concerning company financial statements, with data from Internet search engines and, above all, with information gathered thanks to direct contacts with the companies.

Table 1 shows the distribution of companies depending on their main specialisation as well as the number of companies interviewed. For the purposes of this paper, the focus ranges in

particular from firms specialising in concept design to prototyping, partially excluding the group of global problem solver firms and totally leaving out, due to their specificity, professional consultants and manufacturers of custom-built sports cars.

Global problem solver firms include three historic brand names, *i.e.* Bertone, Italdesign-Giugiaro, and Pininfarina, which are capable of providing complete services and, regardless of their economic-financial situation, have become companies that offer integrated and systemic services.

Given the particular complexity and size of these large firms and with the purpose of preserving a plausible uniformity within the sample, the answers provided were not considered but they were exclusively taken into account to remark on the evidence. Similarly, the interview with the only firm specialising in virtual and in physical modelling was not taken into consideration, since the firm is about to drop these activities and move downstream along the supply chain; more specifically, it will deal uniquely with product development engineering.

In short, the questionnaires used for the analysis of the car styling supply chain were 23. Moreover, in the case of some variables the analysis did not just make use only of the answers provided in the questionnaires but it was integrated with information taken from the firms' websites or from specialised databanks on entrepreneurial activities. Thereby, it was possible to derive features for 28 firms of the overall sample ranging from concept design to engineering and prototyping (Table 1).

The allocation of firms to different specialisations included in the Turin car styling supply chain was based on the answers to the questionnaires and on the information gathered from the firms' websites. In particular, for what concerns the attribution to the concept design group, the key distinguishing element was a consolidated, though not principal, experience in the carrying out of style activities, testified by the development over time of the firms' own concept cars, shown at motorshows.

Table 1: Distribution of the sample by specialisation		
	<i>Number of firms counted</i>	<i>Number of firms interviewed</i>
Global problem solvers	3	3
Concept design	7	6
Virtual modelling	8	8
Virtual-physical modelling	1	1
Physical modelling	9	7
Engineering and prototyping	3	2
Professional consultants	7	0
Manufacturers of dream cars	2	0
Total	40	27

Source: Ceris-Cnr elaboration

4. THE SUPPLY CHAIN REORGANISATION

The automotive industry's capability to generate high value and profit margins is a fuzzy memory and the sector, more so than others, undergoes periodical cyclical crises and, as we shall see, the current crisis is further confirmation.

When actually present, industrial margins are more and more limited. The globalisation of markets is often combined with unfair competition, inappropriate business policies, and state interventions that might implicitly act as competition altering factors.

The role of car design has deeply changed because the automotive industry is deeply changing. This transformation has been affecting coachbuilders for quite some time now: they have witnessed a progressive decrease in orders for producing and assembling the bodywork of limited series models and they have concentrated more and more on the development of niche models and on advanced research, engineering, and production system planning. This decrease in the production of complete vehicles for carmakers has affected not only Italian coachbuilders, Bertone stopped volume production in December 2005 and Pininfarina will cease contract manufacturing in 2011, but also the European ones, such as Karmann in Germany, Heuliez in France, and Valmet in Finland. All these manufacturers are undergoing a deep restructuring phase and only Magna Steyr seems to be partially exempted.

On the other hand, focusing on style activities

clashes with the organisational processes of carmakers. In the last few years, Fiat Auto, for example, has progressively expanded its style centre and, as a consequence, the concept design of its latest models launched was for the most part carried out internally.

This is the strategic solution adopted by several carmakers, both generalized, like Renault and Peugeot-Citroën, and specialised, like Mercedes, BMW, Porsche, and Audi. Style development programmes are implemented only internally, despite the fact that the aesthetic factor has become increasingly important to avoid the risk of uniformity of models across different brands and carmakers, which make heavy, use of carry over and common platforms. This choice is motivated not so much by cost reduction or investment preservation issues but by the will to keep the brand identifiable and the fear that the contribution of an external style centre might alter the overall image of the brand, even though – for specialised manufacturers in particular – experimenting with alternative approaches might turn out to be an opportunity to renovate their imagine.

It is precisely from this point of view that the strategic contribution of the Turin car styling supply chain can be appreciated, giving charm and appeal to products that otherwise would be equivalent in terms of performance, quality-price ratio, distribution, and promotion.

Within the Turin car styling supply chain, in the last few years the restructuring process has caused, besides the abovementioned Bertone and Pininfarina crises and the reorganisation of

the Fiat Auto style centre, the bankruptcy of Carrozzeria Maggiore and the takeover of two physical modelling firms by similar companies. During the same period, however, nine new firms have been set up in all the major specialisations of the car styling supply chain: two of these are capable of supplying car styling completely, five of them specialise in virtual modelling, and two specialise in physical modelling. It is interesting to note that almost all of these firms can be considered spin-offs, since they were established by technical experts who had left other firms operating in the supply chain.

If, on one hand, two of the firms specialised in virtual modelling for the most part act as suppliers of highly skilled labour (body rental), the two firms that are able to supply car styling completely have both adopted an extremely flexible structure like that of a network company. These companies receive orders mostly from the extra-European markets, nevertheless concept design activities are carried out internally, while virtual and, above all, physical modelling are outsourced to the benefit of the Turin car styling supply chain.

Furthermore, the current restructuring process is revealing two additional viable options.

The first strategic option mainly concerns a diversification of the firms' activities towards other types of transportation, such as nautical and aeronautical, and industrial design in its broader sense. The companies interviewed claim that in the past their activities were almost entirely automotive-related, yet the prolonged ups and down carmakers have been experiencing as well as the current enduring and widespread recession have led these firms to significantly advance their diversification strategies, also in order to counter the strong bargaining power of carmakers.

The second strategic option mainly concerns diversification policies in line with broader issues regarding sustainable mobility. Among all the different industrial sectors, the automotive sector is the one which has invested the most in the field of environmental impact, working intensely towards the development of all the technological solutions that enable today's cars not only to ensure higher and higher safety standards but also to be easily recycled as well

as to cut down on fuel consumption and harmful emissions.

To this end, the automotive industry has radically improved on the traditional propulsion systems, reducing the level of harmful emissions by a noteworthy 95% since the 1970s; moreover, it has focused on the research of new propulsion systems with low or zero environmental impact.

These new propulsion systems will also bring about a revolution in vehicle architecture because spaces and external forms will have to be redefined and optimised, considering that the modifications will not only involve changes in propulsion but they might well lead to a radical rethinking of cars.

Lastly, a further element that, due to its high educational value, is likely to support and help the development of the entire car styling supply chain is the establishment of the new Design Centre of the Polytechnic of Turin. The centre will be operational from 2011 and it represents the most qualified section of the Mirafiori Technology Centre, which is being built in an area that once belonged to the Fiat Group and which the carmaker has handed over to the mixed capital company Torino Nuova Economia¹.

Handing over this area to the new company was one of the four pillars of the so-called "Mirafiori Agreement", drawn up by the local authorities to support the Fiat Group during the crisis the Turin carmaker was experiencing in the early 2000s.

The Design Centre will accommodate, first of all, the over two thousand Polytechnic students who are currently attending industrial design courses in another building and will be moved to this new facility. Three buildings of around 13,500 square meters will be built for this purpose. The facility will also host research and technology transfer activities and car styling companies.

¹ Local authorities hold a 90% stake in Torino Nuova Economia (the Piedmont Region and the Municipality of Turin hold 40% each, the Province of Turin holds 10%), while Fiat Group holds the remaining 10%.

5. PECULIAR FEATURES AND COMPETITIVE POSITIONING

On the basis of the answers to the questionnaires and of the information gathered from the companies' websites as well as from databanks specialising in entrepreneurial activities, this section will describe some of the distinguishing features of the Turin car styling supply chain compared to the national and regional entrepreneurial scenario.

First of all, there is a strong tendency towards business consolidation: medium enterprises are around 40% of the sample, small enterprises are 52%, and micro enterprises are 7%. These results significantly diverge from the average of the manufacturing sector not only in Piedmont but also in the main industrialised areas of Italy, where micro companies are around 60% of the total while medium-large companies are only 11%.

Secondly, the car styling firms located in Turin can be considered as an excellent example of the so-called knowledge economy, which is based specifically on the shift from extensive to qualitative-intensive economic development and requires a continuous regeneration of knowledge, *i.e.* particular attention both to the enhancement of human resources and, at the same time, to the broadening of research and development activities. The evidence can be supported by some interesting figures:

- In the companies interviewed, employees having a degree are 25.8% of the total, with higher figures in concept design firms (38.4%) and in virtual modelling firms (32.9%). These data are considerably higher than the average of Piedmontese manufacturing companies, which is 10.3% (Confindustria, 2007).
- Furthermore, 81.8% of firms in the Turin car styling supply chain operate training courses, versus 19.7% of manufacturing companies in the region, according to the Excelsior Information System (Unioncamere-Ministero del Lavoro, 2006). Training activities are financed with 1.7% of the total turnover, a figure that increases to 2.3% for concept design and virtual modelling firms.

- An aspect which is worth mentioning regards R&D. The companies stated that the budget allocated to R&D was on average 2.1% of turnover, with a peak of 3.6% in the case of concept design firms and of 2.8% in the case of virtual modelling firms. This is an unquestionably significant achievement if compared to the average expenditure of Piedmontese companies, which, according to the most recent Istat (Italian National Statistics Institute) survey, is equal to 1.2% of the Piedmontese GDP. R&D activities have resulted in 37 filed patents for half of the car styling firms from Turin.

Another distinguishing feature concerns the setup and structure of the firms. Only a third of the companies analysed in this research fall within the category of family-run businesses, while the share capital of the remaining firms is held either by a large corporate base (17.4%) or by a limited number of partners who do not have any family ties with each other (47.8%). In this case too, a comparison with the general Italian scenario is particularly significant. In fact, according to the Bank of Italy (Giacomelli and Trento, 2005), family-run businesses account for 81.9% of the Italian entrepreneurial scenario.

An unexpected element that emerged during the preliminary phases of this research is the fact that a large number of car styling firms in Turin are part of industrial groups in which they act either as parent or as subsidiary company. 59.3% of firms in the sample are members of an industrial group operating in the same field; this percentage is considerably higher than the national average of 19.1% (Osservatorio sulle piccole e medie imprese, 2007). 33.3% of the sample firms stated that they are the parent company, whereas in 7.4% of the cases the parent company is another European company or one located in Turin, while the percentage of subsidiaries of extra-European companies is 11.1. It is interesting to note that 62.5% of the industrial groups included in the Turin car styling supply chain have been established in the last ten years, which is proof of the sector's strong dynamism, also considering that the vast majority of production units are located abroad.

Table 2: SWOT analysis	
<i>Strengths</i>	<i>Weaknesses</i>
Diffused know-how Operating skills Labour cost	Size Financial situation Lack of qualified personnel
<i>Opportunities</i>	<i>Threats</i>
Carmakers' strategies Diversification of end markets Development of ecological cars Growing support by authorities	Carmakers' strategies Body rental Euro appreciation

Source: Ceris-Cnr

Another distinctive factor, again related to the internationalisation process, regards the level of exports, which is 56.7% of the companies' turnover. This figure is higher, according to Istat, than the export data referring to the region of Piedmont as a whole, around 30%, and considerably higher than the national average of about 20%. On the whole, 43.3% of the turnover is sold in Italy, 30.7% in Europe, 15.8% in Asia, and only 1.2% in the United States.

High performances in export growth have been achieved all over the world, specifically to Asian countries and, to a lesser extent, to European markets, while overall Italian exports of car styling industry products have dropped considerably.

For what concerns competitive positioning, a SWOT analysis approach makes it possible to identify the most prominent features of the Turin car styling supply chain (Table 2).

Strengths:

- One of the distinguishing features of the Turin car styling supply chain is its capability of concentrating creativity, technology, and handicraft expertise in one territory. All of these skills are combined together and influence one another, thus making the Turin district one of the main reference areas for car industry at a worldwide level, an area where all the specialisations linked to car styling are represented by a wide range of businesses with first-rate standards.
- The expertise needed to integrate design skills

into a highly complex production process as well as the ability to implement work methodologies capable of yielding outstanding results in production cycles that are becoming shorter and shorter are qualities that have increased greatly among car styling firms.

- Another, not less important, aspect that works to the advantage of car styling firms from Turin is that they have a lower labour cost than their main European competitors, despite the fact that labour cost in Italy is burdened by high taxation and contributions.

Weaknesses:

- Small size has always been considered a weakness of the Italian manufacturing system. As stated above, car styling firms in Turin partly differentiate themselves from this general situation but they are still too small in comparison with their clients.
- As a consequence, this gap in size affects their financial position in terms of long payment times and low bargaining power. This situation results in low profitability with negative effects on the companies' financial management.
- Despite the increase and success of training programmes in the field of design, a clash has been detected between offer and demand of highly specialised professional profiles. In particular, the knowledge and skills provided by design schools focus more on creative aspects rather than on virtual modelling.

Opportunities:

- The strategies implemented by carmakers can be considered both as a possible opportunity and as a possible threat for the car styling supply chain. The changes occurred at the Fiat Auto Style Centre have been interpreted as a way to further promote and enhance car design and they offer new opportunities especially to companies of smaller size focused on only one phase of the styling process.
- Moreover, in the last few years new manufacturers have acquired a crucial role on the automotive market, especially those based in China and India, from which car styling firms based in Turin have been receiving large orders and acknowledgments of their outstanding qualities.
- The complex set of skills acquired to satisfy the demanding automotive sector, makes for a great potential that can be applied to other means of transports and to any kind of industrial design. Several car styling firms as well as larger coachbuilders are diversifying their business, shifting towards products that are very different from cars.
- Still within the scope of car diversification, car styling firms, in particular coachbuilders, see a new possible source of expansion in the development, manufacturing and, possibly, direct commercialisation of alternative fuel vehicles.
- National and local authorities have always provided the automotive sector with considerable financial support, recently extended to style activities too. A striking example was the Turin 2008 World Design Capital event, which was a great opportunity to showcase automotive design models developed in Turin. Even more striking are the setting up of the new Design Centre at the Polytechnic of Turin and a range of initiatives by the Chamber of Commerce of Turin, funded by the Piedmont Region, such as the “From concept to car” programme, which promotes the best Piedmontese car suppliers abroad, or “VETIS”, now in its seventh year, which endorses business contacts.

Threats:

- If on one hand the presence of only one Italian

carmaker is seen as a great obstacle to the development of the car styling supply chain, on the other hand the major carmakers’ recent reorganisation of their style centres could reduce the demand for external consultants. Similarly, new Chinese and Indian manufacturers might start to perform style-related activities internally. Moreover, the competitive scenario is also characterised by the difficulties which carmakers were already going through due to a contraction in demand and which the current economic crisis has intensified, leading to the slowing down or even the complete halt of investment plans for new models.

- As a consequence, there has been an alarming increase in practices linked to the temporary lending of designers to client firms (body rental). The Fiat Group has recently started adopting this method too. Basically, a carmaker temporarily hires a certain number of human resources, generally virtual modellers, from a car styling firm to develop a specific, large or small scale project.
- Lastly, since most car styling firms do not make great use of materials, the strong appreciation of the Euro has led to a loss in competitiveness in comparison to both developing countries and industrialised countries that are not included in the Euro area, such as the United States and Japan.

6. THE IMPACT OF THE CURRENT CRISIS

The investigation described in this paper was carried out in the winter of 2009 by means of interviews and, following the worsening of the economic crisis, some quantitative variables were updated at a more recent time.

In particular, talking about the economic situation, all the firms operating in the car style sector agree that the crisis has been perceived since January 2009 and that until then the market had seemed to hold, most probably due to a certain degree of internal inertia. Preliminary turnover data for the early months of 2009 show that in many cases there was a 30% decrease in orders, but at the end of the year the range reduction has been from 20% to

75%. The current shrinkage in demand goes hand in hand with a drop in car sales. Some firms had foreseen a less negative scenario but that was mainly due to the inertia typical of some of their activities; in the vast majority of cases, the economic outlook is not positive and most of the firms interviewed agree on the fact that the future depends entirely on a pickup in demand, above all generated by state incentives.

Alongside a generalised decrease in turnover, there is also an equally worrying drop in orders caused by the interruption or postponement, at times with no certain timeframe, of projects that had already been initiated or were about to start. The crisis is perceived approximately in the same way both on the Italian and on the foreign market. The Fiat Group seems to be going through a deep reduction of new models, which is persistently causing projects to be stopped or postponed. The only markets that still appear to be retaining a certain degree of stability are the German market in Europe and those of developing countries, such as India, where the economic crisis has not yet had any manifest consequences. On the contrary, in France the situation seems to be particularly dire.

Many interviewees agree that the automotive sector is about to face deep structural changes: it is the concept of the “car” itself that is being challenged and together with it the methods by which it is designed and produced. In this period it is impossible for most of the firms to be able to plan their future activities, due to continuous cancellations or deferments of projects.

At present none of the firms interviewed declare that they have had to resort to job cuts but this regards only in-house human resources. The sector used to be characterised by an inherent tendency to employ external manpower, in order to cope with temporary situations and with the frequent peaks in workload that had regularly occurred during the previous years. External professionals were the first to be affected by the economic crisis and their numbers have been considerably cut down. Moreover, there have been several instances in which employees temporarily lent to Italian and European car manufacturers have returned to their firms, which confirm that *body rental* is becoming more and more common. For the time being, these individuals have been entrusted

with temporary assignments, in view of possible personnel reductions, should the economic crisis last for a long period. Obviously, all the scheduled recruitment plans have been cut down and, in most cases, completely cancelled. To cope with this situation, 66% of the firms recur to the wages guarantee fund (CIG).

Several of the interviewees claim that they have already begun diversifying their activities, expanding into sectors different from the automotive: the *industrial design*, nautical and railway fields are the main new end markets for car designers but these will, however, remain minor activities alongside their main line of business. The problem is that diversification stems from long-term strategic choices, by means of which it is difficult to counteract sudden critical situations such as the present one. Those that had already begun diversifying their activities aim at continuing in this direction, whereas the other firms are undergoing serious difficulties. In general, almost all the firms interviewed claim that diversifying their business is, at present, the main lever they can use to face the economic crisis. There are, however, some who disagree: a number of firms regard sectors other than the automotive as not very remunerative and, above all, not developed enough to be able to allocate to design an amount of resources comparable to that invested by the car industry. In any case, all the enterprises agree in stating that the automotive sector will continue to be their main reference market.

Furthermore, in a period as difficult as this, profit margins for designers and prototypists are dwindling, especially in the sectors in which these activities play a secondary role and are less deeply rooted.

7. A FUTURE FOR COACHBUILDERS

The process of reorganization of the value chain in the automotive sector, which was begun in the early 80s, had gradually redefined the functions between the various players and ascribed to car makers the role of brand integrators with specific competence only, but not necessarily, in design, marketing and sales.

In addition, the automotive filiere would be characterized by other four specialist groups (Jürgens, 2005):

- technology specialists that focus on specific parts and technologies;
- specialists for modules and systems like the front end, the cockpit, etc.;
- specialists for development services, engineering firms for the development of vehicles and vehicle components;
- assembly experts on behalf of the brand name company, that is coachbuilders.

Küspert (2000) estimated the distribution of value within the new segmentation of the industry and its deviations for each specialist group. The percentage attributed to coachbuilders was 15%.

In 2003, a study by McKinsey gave special emphasis to the consistent savings that carmakers could have achieved if they had made heavier use of subcontracting for the production of niche models, while continuing to concentrate on the development of new models and on mass production. As a consequence, the so-called coachbuilders – such as Karmann, Magna Steyr, Valmet, Bertone, and Pininfarina – could have expanded their business despite the unfavourable situation of the car market (Die Welt, November 29th 2003). Somehow, this is the reason of the currently unprecedented crisis that European coachbuilders are facing. They became just an extension of carmaker plants and lost the added value that made them unique. Above all Italian coachbuilders were famous for the beautiful cars they designed and built themselves.

In fact, this scenario was supported by the fact that coachbuilders had modified their production structure with the purpose of offering global designing services to secure the production of small series models and had developed flexible production lines capable of assembling up to eight models on one line.

Just a few years later the automotive sector and coachbuilding activities reorganised themselves in a completely different way. Even before the financial crash of autumn 2008, European coachbuilders were already having serious troubles in updating their portfolio of

orders and in coping with debts. In spite of the redefinition of company strategies offering global services to carmakers, most coachbuilders witnessed the stoppage of some ongoing productions and a substantial drop in orders.

For example, in France, where the signs of the impending crisis appeared earlier than in other European countries, the stoppage in the production of the Avantime model by Renault caused great financial difficulties to Matra Engineering, which has been a member of the Pininfarina Group since 2003. Following a drop in orders and turnover, the Duarte Group was not able to cope with its extensive debt: it underwent a thorough restructuring in 2004 and the business was completely closed down in 2007.

Also in 2007, Karmann, Heuliez, Bertone, and Pininfarina redefined their development plans by cutting back personnel and looking for new capital. During that year Karmann had a production capacity of 100,000 cars but the capacity utilisation was 42%, with around 7,000 employees. As for Pininfarina, its installed production capacity was 80,000 vehicles with 62% capacity utilisation and 3,000 employees. The situation of the French group Heuliez was even more critical, since its annual production was only 24% of the potential 50,000 cars it was capable of producing.

For the group Karmann, the loss of four additional orders, assigned to the competitor Austrian Magna Steyr, involved the complete cessation of building vehicles in September 2008 with an initial radical downsizing with a focus on vehicle development and production of car sunroofs for cabriolet models, and with the current state of insolvency and possible split of the activities in more buyers.

In summer 2009 the Bertone crisis was resolved after a long dispute between its owners. The Fiat Group has taken over the manufacturing unit, probably to assemble Chrysler models for the European market, while styling and engineering activities have been unified under the control of a branch of the Bertone family, more likely to follow the Italdesign-Giugiaro business model.

In the fall of 2009, Pininfarina has disposed

of one of its plants and transferred 900 employees to a consortium of Italian and foreign entrepreneurs for the production of luxury cars in aluminium from 2011. The operation was possible thanks to the Piedmont Region through the regional finance institution that bought one the Pininfarina plant that will be leased to the new car makers.

At present, the major European coachbuilders believe that the production and commercialisation of electric cars, also by using their own brand name, might be a possible solution to the problems that they were already experiencing even before the current financial-economic crisis had become fully manifest. There are two main reasons behind this opinion. Although the market for electric models is attracting more and more interest, it is characterised, especially in Europe, by low sales volumes, which are not suited to the production processes of large assemblers. The absence of an internal combustion engine and of a transmission system entails a major redefinition of vehicle architecture, which is one of the main skills coachbuilders possess.

As illustrated in table 3, Pininfarina, Karmann, Valmet, and Heuliez have all announced the development of electric cars. These implementation plans have, in some cases, already reached quite an advanced stage.

Most of these European coachbuilders have already worked in the sector of electric cars. The German company Karmann is currently

manufacturing an electric van for EcoCraft. In the 1990s the French company Heuliez produced over 6,400 electric vehicles for the automotive group PSA/Peugeot-Citroën.

As far as Pininfarina is concerned, the Italian coachbuilder has officially announced the production of an electric compact car, the Bluecar. The original concept was called B0 and it had been developed through a joint venture with the French industrialist Vincent Bolloré. This project originates in the takeover by Pininfarina of the French company Matra, which had established a lasting collaboration with the Bolloré group.

The first experimental units will be available in autumn 2009 and the production is expected to reach 10,000 units per year by 2012, which will be distributed throughout Europe. Production will take place in one of the Italian plants, so that the number of redundant workers will be reduced to a minimum. In order to facilitate the matching of supply and demand, considering that consumers are not yet used to electric propulsion, it will be possible to rent the Bluecar for a minimum period of three months at 330 Euro per month and 24/7 technical assistance will be provided by a dedicated service centre. The car will be equipped with lithium-ion batteries ensuring a 250 km autonomy; moreover, energy will be reclaimed while braking and recharging will be completed in 5 hours connected to a standard electrical outlet.

Table 3: Some electric models announced by European coachbuilders

<i>Coachbuilder</i>	<i>Partner</i>	<i>Model</i>	<i>Type</i>	<i>Maximum expected yearly production</i>
Heuliez	French Government	Friendly	Small van	3,000 in 2010, then 10,000
Heuliez	French Government	Will	Hatchback	5,000 in 2010, 50,000 in 2014
Heuliez	Argentum	Pondicherry	Pickup	n.d.
Karmann	EcoCraft	EcoCarrier	Small van	1,000 in 2009
Karmann	DuraCar	Quicc DiVa	Small van	Up to 15,000
Pininfarina	Bolloré	Bluecar	Hatchback	Up to 15,000
Valmet	Fisker Automotive	Karma	Sedan	Up to 15,000

Source: AutomotiveNews Europe, November 10th 2008

8. CONCLUSIONS

The car styling supply chain includes a limited number of international competitors, capable of offering complete services and of acting as problem solvers. The investments needed to provide for the needs of prototype research and development as well as the financial capabilities the companies must have in order to operate on this market play a crucial role. Few industrial groups hold a worldwide leadership and some of them have established themselves over a relatively long period of time and have been strongly linked to the history of certain carmakers, also somehow contributing to their success. Only the firms specialising in virtual modelling display different features, since their business requires lower financial resources, depending on the level of engineering services offered.

As this paper has repeatedly emphasised, the market is mostly made up of small enterprises that focus on either the design or the engineering segment to cater for the needs of carmakers; a large number of these firms have been set up as spin offs, often by the very design centres of carmakers. These firms are top-quality producers that boast an excellent reputation from the point of view of their image and creativity in the field of styling as well as in the actual execution of project. The car styling supply chain also includes a very high number of professional consultants, which have outstanding creative skills and are highly specialised.

In the new international competitive context, all Italian car styling companies have strived to best cater for the needs of the style centres of carmakers based in developing countries.

The sound reputation that the car styling firms from Turin have long been enjoying has contributed to a widening of the offer: small designing and mathematical modelling practices as well as physical modelling labs are now numerous, amounting to around forty. Hence, competition is becoming considerably tougher, also because the Polytechnic of Turin and the local design schools supply more and more aspiring designers.

The main risk is that concept design skills

might be abandoned little by little and that there might be a progressive shift towards virtual modelling activities, with low or non-existent decision-making abilities and the sole contribution of body rental. These activities might involve large international engineering groups, offering extensive experience and know-how especially in product and process engineering and lower costs. In relation to this, it would be advisable for carmakers' style centres to perform correct analyses of costs and benefits deriving from projects completely developed internally, involving the continuous recruitment of temporary external human resources, in comparison to the outsourcing of activities; this could be done simply by means of overall assessments. The key benefits of insourcing include skill accumulation and control over information, while its main risks are related to management issues such as waste of resources and long downtime periods.

Design is a crucial strategic element for the new global challenges issued by recently industrialised countries, which are capable of manufacturing at much lower costs in comparison to European countries. However, taste and creativity alone are not sufficient, they must be supported by ongoing investments in new technologies and by high-level training schemes. Only by doing so will the Turin car styling supply chain be capable of maintaining its role as worldwide reference point and its ability to influence, thanks to its talented personnel, the very evolution of the concept of car models.

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