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CSR Activities and Impacts of the Automotive Sector

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Sector profile based on a literature review
developed in the course of the FP7 Project
IMPACT - Impact Measurement and Performance Analysis of CSR

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1. Abstract

Competition in the automotive industry is characterised by overcapacity, high market saturation, high labour and fixed costs, and the need for constant product development and innovation. Due to mergers, very few global players dominate the automotive market, causing major entry barriers. Owing to a high motorization rate in Europe, demand is largely based on replacement. This has led to a dramatically shortened product life cycle and to constantly differentiating brands and models. Slim margins press automakers to pay more attention to after-sales services to improve profitability.

From the environmental point of view, the crucial issue is a relatively long life span of the industry's products. Thus, about 80% of environmental impacts stem from the usage phase of the car. This offers room for improvement, especially in the design phase (using lightweight materials, improving fuel efficiency, inventing new energy sources). Due to the mass use of cars and their shortening life cycle, end-of-life vehicle is also perceived as an important issue. It is now regulated by the EU, but is also recognised as a CSR issue by the producers themselves. As car manufacturing is characterized by long and numerous supply chains, producers' responsibility should be expanded to the whole supply chain.

Car manufacturers are engaging in CSR activities concerning end-of-life-vehicles and producers' extended responsibility for their products, green supply chain management, environmental management schemes, and labour codes of conduct (such as ILO and GRI standards).

Concerning quality of work, the automotive industry is shaped by conditions typical to a high-skill high-quality sector. Still, working conditions vary according to the specific production system of a plant, which is largely dominated by its owner. Scandinavian team production offers higher autonomy and job satisfaction, but considerably higher workload and stress than a traditional line assembly. The German model of specialized and general workers strengthens differences in payment, job security, and training compared to more reflective production systems. As a common pattern, a strong focus lies on ergonomics. Another issue is safety in combination with training. Job stability and flexibility (including agency contracting) is an issue for non-specialized employees with low skills and low-wage jobs, which still exist in larger numbers in Eastern Europe. Social dialogue and worker involvement is interesting due to two factors: First, worker involvement is a necessary factor for innovation and quality, and employees are difficult to replace and therefore valuable to the company. Second, the core workforce in Europe's automotive industry tends to be well organized, which is a threat if social dialogue fails. Only one fifth of the workforce is comprised of women, and there is no representative research on gender issues, or on work-life balance.

2. Facts and figures

The EU is the largest producer of motor vehicles in the world; hence, automotive industry plays a very important role in the overall European economy - exporting much more than it imports. Moreover, with 18.4 thousand enterprises, it employs over 2,2mln people, 1/3rd of all manufacturing jobs in EU 27 (IHS Global Insight, 2009) and thus is a major employer of skilled workforce (Eurostat, 2009, p. 286). The automotive sector also accounts for one of the biggest shares of private investments in R&D and covers a wide range of materials in its supply chain: metals, plastics, chemicals, textiles and electric & electronic systems (ACEA, 2009).

The automotive sector is also one of the sectors that was hit the most as a result of the global financial crisis. In 2009, total vehicle production in Europe (cars, trucks, buses) decreased by 17.3% compared to 2008 and by 23% compared to the pre-crisis levels of 2007 (ACEA, 2010, p20). Out of the top players the worst hit in 2008 was Italy (-20,3%) followed by France (-14,9%) and Spain (-12%) (ACEA, 2009).

The sector according to NACE (version 1.1; for the automotive industry in the NACE 2.0 see Annex 1) belongs to the NACE Subsection DM that covers two sub areas: motor vehicles production and production of other types of transport equipment (shipbuilding, railway rolling stock, aerospace equipment, motorcycles and bicycles, and others). The whole subdivision is characterised by large (>250 persons employed) enterprises. However, the whole transport manufacturing covers several tiers of suppliers sometimes providing only a single component (Eurostat, 2009). The motor vehicle production represents by far the largest share of the sector turnover and employment (see table 1)

Manufacture of transport equipment	**Share of sector employment (2006)**	**Share of sector value added (2006)**
Motor vehicles, trailers, & semi-trailers	73,9%	70,6
Ships and boats	5,8	9,5
Railway equipment	3,6	5,2
Aircraft and spacecraft	15,4	12,2%
Miscellaneous transport equipment	1,5%	2%

Table 1: Manufacture of transport equipment (NACE Subsection DM) Source: Eurostat 2009

The main sub-sectors of the motor vehicle sector (NACE 1.1, Group 34) are the following:

Automotive sub-sectors in Europe	Share of sector employment (2006)	Share of sector value added (2006)
Manufacture of motor vehicles	49%	61%
Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	8%	5,7%
Manufacture of parts and accessories for motor vehicles and their engines	42%	33,3%

Table 2: Automotive sector: Importance of sub-sectors. Source: Eurostat (2009)

As table 2 shows, manufacture of motor vehicles and manufacture of bodies for motor vehicles, trailers, and semi trailers are the most important sub-sectors in terms of the share of sector employment and the share of sector value added in Europe.

The five largest national shares account for 69% of motor vehicle production (Germany, Italy, France, United Kingdom, and Spain) (see figure 1). The same group of five countries are also the top five in terms of European value added and total number of persons employed in automotive sector (Eurostat, 2009).

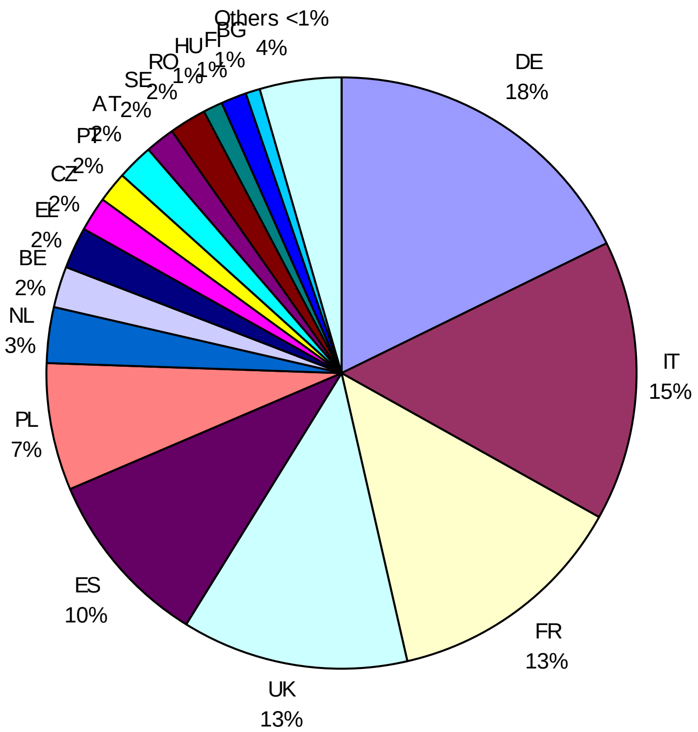

Figure 1: Country share % of total European motor vehicle fleets (2008). Source: OICA, 2009

Sector employment: The motor vehicle sector is characterized by a predominantly full-time male workforce (79,4%). Due to the lack of recent data, the accurate effect of the financial crisis on the employment in the automotive sector is difficult to assess – the most recent employment figures are only available for 2007. However, the industry has indicated that 15-20% of the automotive labour force is at risk, while a crisis in the automotive sector also puts its suppliers at risk (EC responding to the crisis in the European automotive industry). The trend in employment shows concentration: A slight decrease of employment figures in EU–15 countries (2001-2007) faced a growing workforce in EU-10 countries (ACEA, 2010).

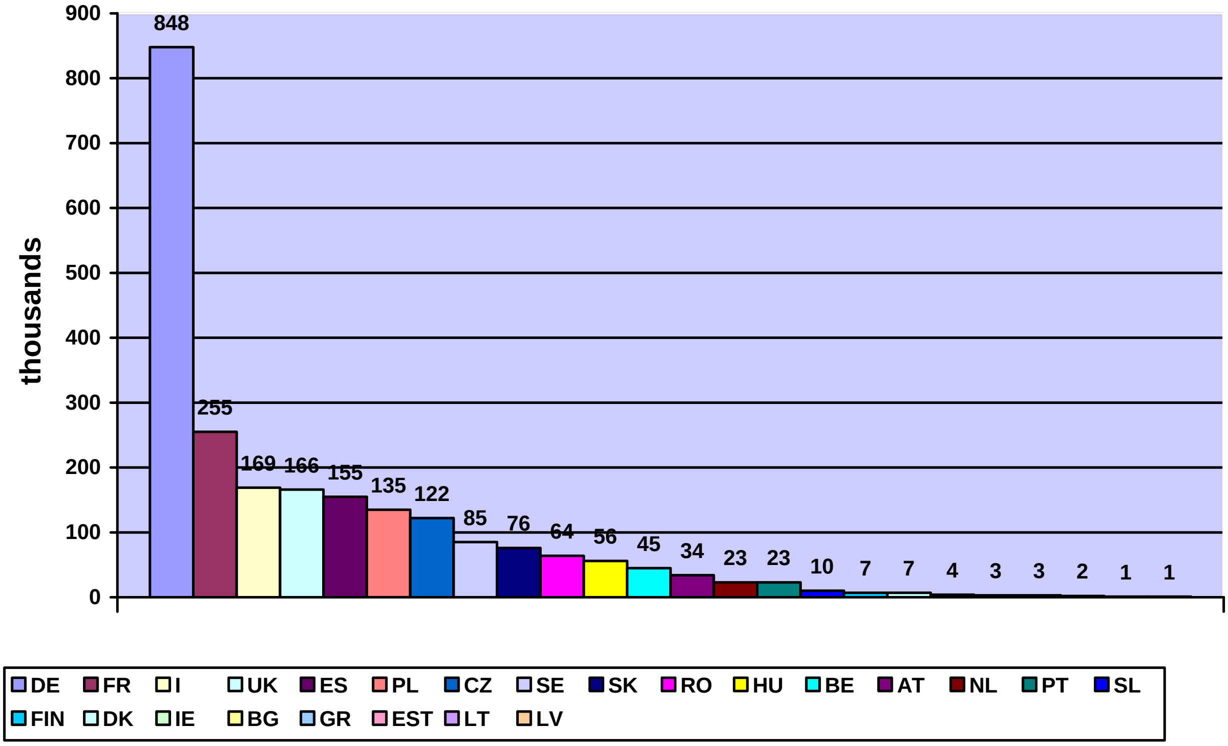

Figure 2: Automotive employment by country. Source: ACEA (2010)

3. Growth and competitiveness

Sector growth: The demand for transport equipment has been rising until 2007 (Eurostat, 2009). However, the financial crisis caused a sudden drop in demand. Together with limited access to credit, the automotive production in Europe fell dramatically by the end of 2008. Table 4 shows the decline of motor vehicle production in various EU regions.

Country	2008	2009	% change
EU - 27	18,439,079	15,252,862	-17,3%
EU - 15	15,174,690	12,241,033	-19,3%
EU New members	3,264,389	3,011,829	-7,7%

Table 3: motor vehicle production change in units and %. Source: OICA 2009

The automotive sector has been one of the most affected during the financial crisis, with a record decline of almost 20% - the largest decline ever recorded. This phenomenon is partly explained by the fact that 60-80% of new car purchases in Europe are financed by credit. The trends for the near future are also not encouraging (European Commission, 2009b, Wad, 2010).

European automotive sector growth has been largely fed by the demand from new member states, while the demand in Western European countries has been quite flat in recent years. However, this trend changed. From 2008 onwards, after the economic crisis, the whole industry remains sluggish. The main demand is expected to come from emerging markets (China, India, or Russia) where European manufacturers already have significant presence (European Commission, 2009a). According to the European Commission, the main driver for competitiveness in the global automotive sector will be technological competition, especially in terms of fuel and energy developments, in which the European automotive industry is already well positioned. Moreover, European car makers face a challenge in terms of cost competitiveness in these markets – Europeans often focus on premium cars, have higher labour costs, and are affected by stricter regulations (European Commission, 2009).

Sector competitiveness: In 2005, the European Commission has launched the CARS 21 process (Competitive Automotive Regulatory System, for the 21st century) (European Commission, 2006) that until now serves (or at least it was planned to do so) as the main watchdog of the development in the competitiveness of the European automotive industry (European Commission, 2009b). In the CARS 21, the main challenges in relation to competitiveness were summarized:

- Globalisation of economic activities: Automotive sector is increasingly becoming globalised, thus the European car makers need to virtually compete with everyone and everywhere.

- A rapidly changing operating environment and innovation competition: European manufacturers have to continue high investments in R&D in order to keep up with their global competitors in terms of technological breakthroughs.
- Greater environmental and health concerns and the regulatory environment: EU customers pose ever increasing demands in terms of safety, comfort, and fuel efficiency, thus car makers have to compete in terms of both – price and meeting societal goals.
- Market environment: Above all, challenges have to be met in an environment of limited future growth and inflexible prices (European Commission, 2006).

In its latest communication “Responding to the Crisis in the European Automotive Industry”, the European Commission has identified these issues in order to contribute to long-term competitiveness. Investments in R & D and innovation for developing “green” cars are essential (European Commission, 2009b).

When looking at market shares, production volumes, value added, and employment, the European automotive industry has maintained its global competitiveness in the last years. However, it also faces various challenges like overcapacity, low productivity levels, high labor costs, high fixed costs, little market growth, and new technologies. Competition in the European automotive markets is intense. Evidence to support this thesis can be found in successful new entries, fluctuating market shares, shorter product life cycles, and increased consumer choice. While drivers of competitiveness in the short run may be productivity and labor costs (which seem to be more favorable in Japan and in the USA), innovation is the key factor in the long run. European firms, which are global technology leaders (also because of a demanding home market) have to continue innovating and investing in R&D to remain competitive. Its strong supplier base and strict regulatory standards for environment and safety may further support the innovation processes (Heneric et al., 2005; Europäische Kommission, 2009; Eurostat, 2009). On the contrary, according to Donnelly et al., (2002) the European automakers responded to global competition challenges by costs reduction, shed labor, rationalizing plants, raising productivity, and improving their relationships with suppliers. However, the authors conclude that these reactions were delayed and Europe remains the weakest of the triad car manufacturers. Yet the European industry is at the forefront in terms of technology because the leading brands can practice cost recovery (in contradiction to cost reduction) on a market where customers are willing to pay more for the brand, exclusivity, and marginal gains via innovation.

The role of innovations in the automotive industry was scrutinised by Tseng and Wu (2007) who developed five indicators of innovation quality and compared 17 global automobile firms by means of these indicators, whereas three of the indicators (patent count, citation-weighted patents, scope of innovations) positively and significantly affect firm profits. Furthermore, Liang and Iuan (2006) show that automakers actively engage in product innovation (issuing a large number of patents), especially if they produce high-quality products (showing low numbers of failure).

Competition in the automotive sector is strongly influenced by highly saturated markets and overcapacity (Orsato, Wells, 2007b; Volpato, Stochetti, 2008). Most of the Western car markets entered into the high saturation phase in the 70s of the previous century. It resulted in a high motorisation rate. Consequently, demand almost entirely consists of replacement purchases. This pushed car makers to provide products with high degree of differentiation and to dramatically shorten the product life cycle. To keep their market positions, car producers must be able to offer a new or better car at any moment that the client makes a decision to replace the old product. The customer decision is mainly based on the willingness to have a better car with innovative solutions, rather than by technical default of the old car (Volpato, Stochetti, 2008). Therefore, some authors recognised brands and mergers as the most important competitiveness factors in the automotive industry. Wells and Morreau (2005) give an overview of car brand names, models, body styles and variants in the UK market in 1994-2005 periods. The number of brands remained constant, while the number of models rose from 205 to 323, number of different body styles increased from 300 to 376 and number of variants from 1303 to 3155 (which also undermines economies of scale). Similar overview was given by Volpato and Stochetti (2008) for the Italian market (1984-2006 periods). Again the number of brands remained almost constant, (rose from 54 to 55), while the number of models increased from 170 to 281 and the number of versions from 696 to 3440. The emergence of international mergers and alliances can be explained by excess capacity, economies of scale and access to global markets (Fai, Morgan, 2007).

Tay (2003, p. 24) stated that “achieving and sustaining competitive differentiation is the most foremost challenge for the remaining automakers around the world, and their key to future survival and prosperity”. According to Tay (2003) there are three parameters by which differentiation can be expressed: quality, cost/value relation, and timeliness. The traditional measures of quality are reliability, durability, noise, vibration, and harshness control. But they are no longer sufficient enough. Other quality factors crucial for car makers are: safety, use of electronics and their applications, new energy sources, etc. Cost/value referrers to the relationship between providing a high value products to consumers and reducing costs both linked with product design as well as with service and maintenance costs. Timeliness simply means delivering a new product to the market faster than other competitors. For example, leading Japanese automakers such as Toyota or Honda have the capacity to roll-off new models from their assembly lines in 12 months or less.

The importance of the differentiation strategy was also stressed by Renard (2002) and Dietl et al. (2009). However, the latter concluded that it will no longer be a sufficient source of long-term competitiveness, as distribution and complementary services (in finance and after-sales) are becoming much more important. The importance of distribution is increasing due to fierce competition resulting from the rising number of players, innovative sales channels, and the new balance of power between the traditional franchised dealers and the vehicle manufacturers. Another factor strengthening the role of distribution stems from the fact that the automotive industry is characterised by slim margins between profit and loss. This is due to two factors. First is the imperative of economies of scale. 250 000 cars per model and year is considered to be a minimum outcome bringing profitability (Bremmer, 2000). It means that a typical plant with a production capacity of 300 000 cars per year must reach 80 % of its utilisation to be viable (Orsato, Wells, 2007b). The second factor is manufacturers' inability to capture profits generated by the whole life cycle of a car – from manufacturing to sales, ownership, and use. When considering all activities linked with car manufacturing, retailing, leasing, servicing, insurance, finance, and car parts, car producers and components suppliers together have about 3,5 % returns on revenue (Orsato, Wells, 2007b). Therefore, car producers try to increase their profit margins by engaging in after-sales activities.

Table 4 below summarises literature on the critical success factors in the automotive industry.

Success factors - automotive sector	**Authors / Year**
Innovation, improved environmental performance	Triebswetter, Wackerbauer, 2008
Different approaches to new, environmentally friendly products design	Willander,2007
Manufacturing excellence, value-added of product, market expansion, financial returns, and intangible values	Sirikrai, Tang, 2006
Superior environmental performance	Pil et al., 2003
Network resources, knowledge-sharing initiatives between supplier and manufacturer	Dyer & Hatch, 2006
Brand distinction, supplier integration, protection of technological innovations, valuable complementary services in finance and after-sales	Dietl, Royer, Stratmann, 2009
Factor conditions in the home market, strong and dynamic supporting industries, demanding customers	Sledge, 2005
Minimization of costs and maximization of differentiation	Renard, 2002
Product life cycle, product differentiation	Tay, 2003 ;Volpato, Stochetti, 2008
Degree of differentiation, shortening product life cycle	Orsato, Wells, 2007b
Product innovations, high-quality products	Liang, Iuan, 2006
R&D, "green" innovations	European Commission, 2009b
Emergence of international mergers and alliances	Fai, Morgan, 2007
Innovations indicated by patent count, citation-weighted patents, scope of innovations	Tseng, Wu, 2007
Green manufacturing	Menzel et al., 2010
Managerial resources and technology capabilities	Sirikrai, Tang, 2006
European automakers' reactions to increasing global competition	Donnelly et al., 2002
Supply chain management	Oh, Rhee, 2010; Sánchez,Pérez,2005
Organisational learning	West, Burners, 2000
Contribution of supplying industry, "Partnerships for Innovation"	Roth, 2006

Table 4: Automotive sector: literature on success factors

Sledge (2005) found - by means of a study of the 50 most successful automotive companies and using Porter's diamond as a theoretical background (demand conditions; factor conditions; related and supporting industries; firm strategy, structure and rivalry) - what comprises national competitiveness in the global automotive industry. First of all, "more demanding customers in the home market positively impact a firm's global competitiveness". Secondly, "more advanced factor conditions in the home market may also positively impact a firm's global competitiveness" and "strong and dynamic related and supporting industries in a firm's home market advance and strengthen the automotive industry". However, with the fourth element - firm strategy, structure, and rivalry - no relationship with national competitiveness was indicated.

Another model to analyze industrial competitiveness applied theories from both the strategic and operations management perspectives to determine which organizational performance indicators are important when assessing competitiveness and which drivers could lead to better economic performance. Identified competitiveness indicators comprise manufacturing excellence, value-added of product, market expansion, financial returns, and intangible values. Competitiveness drivers, however, can be divided into industrial competitive conditions (basically Porter's five market forces), government roles, managerial resources, and technology capabilities (Sirikrai, Tang, 2006).

Willander (2007) analysed three big car producers – Ford, Volvo, and Toyota – trying to identify differences in their willingness and ability seek technological changes in their production processes. The author found that all of these companies addressed environmental problems differently, with Ford and Volvo looking for alternatives to petrol and cleaner energy sources, and Toyota being much more innovative and designing cars for less energy demand. According to the author, Toyota was much more successful thanks to its high aspirations to discover new technology, together with its more open-minded approach to environmental issues (by experimentation, testing, learning by doing). Willander (2007) also found that the company's opportunity to benefit from going green is dependent on customers' values, expectations and needs, e.g. private customers and fleet customers turned out to have rather different good domains.

Triebswetter and Wackerbauer (2008) scrutinised an automotive industry in the region of Munich. They found that integrated environmental innovation is driven by factors such as regulatory pressure, the search for competitive advantage, and technological lead and customer pressure. The study revealed that regulatory pressure and voluntary approach have very similar effects on environmental innovations. The authors also highlighted some economically successful eco-innovations.

However, in industries such as the automotive, a technological lock-in might occur which can make companies blind for technological and economic opportunities as well as create a powerful exclusion effect (Dosi, 1982). Any company questioning itself about boosting profitability by going green first analyses its technological paradigm (Dosi, 1982). The latter is a part of a greater technological system (Hughes, 1987).

Each organisation in an industrial sector is a part of such a technological system, and it is mirrored in the company's organizational structures. The combination of technological lock-in and organizational proximity strongly influences the product design and the probability of eco-innovation.

Nevertheless, studies also exist providing evidence that these green approaches do not always show the desired effect on financial indicators. For example, a study analyzing Europe's automotive and pharmaceutical industries revealed no significant relationship between greener manufacturing and corporate performance (Menzel et al., 2010).

Quite frequently, the role of suppliers' capabilities in the automotive industry was scrutinized. Oh and Rhee (2010) found that suppliers' flexibility and engineering capabilities positively affected a collaboration in new car development, which at the end positively influenced the competitive advantage of the car manufacturers. Sánchez and Pérez (2005) highlighted that flexibility along the supply chain is a factor positively affecting firm performance. Sturgeon et al. (2008) gave a broad discussion of the role of networks in the automotive industry.

West and Burnes (2000) discussed the importance of organizational learning as vital factor in building an organization's competitiveness. According to the authors, managing uncertainty and change is essential for success in the automotive industry. Thus. companies are seeking to promote organizational learning in a systematic and organization-wide manner. They named the issues which are of the prime importance: building closer links with customers and suppliers, involving the whole organization into recognizing and responding to the external events, developing organizational culture which encourages established ways of working and thinking to be challenged by individuals and teams, and enhancing individuals to contribute to the organization's performance.

Roth (2006) highlights the main challenges for further growth and competitiveness in the automotive sector, which are the tougher competition, the saturated markets, the growing excess capacity, and the radical change in the demand structure. Additionally, the dramatic rising of commodity prices of steel, oil, plastics, as well as other basic materials causes a market and consumer driven reorganization. Hence, restrictive credit policy and the cost and price pressure from manufacturers result in cost pressure on the workforce, decreasing pressure on collective agreements, and pressure to shift locations. However, the EU states still remain a relevant production market in the long term, but their importance as a sales market is foreseen to keep declining. According to Roth (2006), the only sustainable economic model for the future is that of mutual cooperation within the value chain, in which not only benefits and rewards are balanced, but also sufficient financing and investment are provided. Due to cooperative processes and value creation in the supply chain, benefits and synergies, especially in product and process innovation, can be developed through pooling their expertise and consequently counteracting against relocation. Cooperated value-added processes also exert a constant pressure to innovate due to the proximity of competitors, partner, users and science, and guarantee for long-term jobs in the regions concerned.

4. Environmental issues

An environmental pressure imposed on the automotive industry cannot be denied. According to Whitelegg (1993) about 26, 6 tonnes of waste and 922 m^2 of polluted air are produced before a customer can use an average car. And it is highly significant that these numbers represent only about 10 % of all environmental pressure imposed by the whole life cycle of the car. About 80 % of this pressure stems from the usage phase, and another 10 % is linked with the disposal of the car. A simplified car life cycle is presented at Fig.3.

Comparing an average car from 1975 and 2000, the amount of air pollution decreased by 95 % (Graedel, Allenby, 1998). Surprisingly, the total amount of pollution resulting from car manufacturing and use increased, mainly due to the boost of number of cars in the world.

The post-use phase has witnessed huge changes during last decade, especially in the EU. In 2000, the End-of-Life Vehicles Directive was implemented to encourage manufacturers to develop components and vehicles that are easy to dismantle and recycle. According to this regulation, car producers should reach 95% recovery/re-use rate and 85% recycling rate by 2015. Smith and Crotty (2008) analysed the influence of the EU End of Life Vehicle Directives (ELVD) from the point of view of ecological modernisation. They found little evidence that this new regulation stimulated product innovation beyond short-term, incremental technological trajectories. In Europe, approximately 75% of the weight of all End-of-Life vehicles is recycled. This mainly corresponds with a metal fraction, while other components (such as plastics, windows) are disposed of. Also toxic materials contained within road vehicles (oil, batteries, heavy metals) do not receive proper treatment (Smith, Crotty, 2008; see also Fergusson, 2007). However, the latest data suggest that there is a substantial improvement in terms of ELV reuse and recycling rate (http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/documents/0501ENnew_labels_halo.pdf). However, it is worth mentioning that most materials from the old cars are not recycled into new cars, but downcycled into less demanding applications. Thus, the automotive industry remains a major consumer of virgin raw materials, regardless the level of recycling.

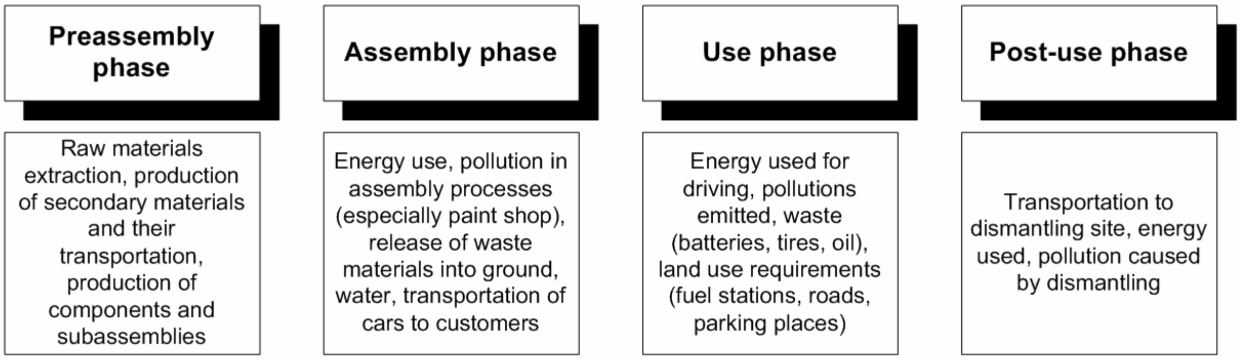

Figure 3 Simplified car life-cycle environmental impact

Source: Authors' own elaboration based on Orsato, and Wells, 2007b.

The design of the car seems to be the crucial activity when aiming for decreasing an adverse impact on the natural environment, considering the whole life cycle of the product. Redesign of the cars may include using lightweight materials, improving fuel efficiency, and inventing new sources of energy. Proper design is also a key factor to reach the highest recycling and reuse rates. However, there are several obstacles that hamper development of new, innovative solutions. One of them is a technological lock-in, resulting from a highly oligopolistic market structure and an existing technological paradigm that is also mirrored in the organisational structure (Dosi, 1982; Hughes, 1987). Van den Hoed (2007) presented this phenomenon, explaining the emergence and development of alternative sources of energy such as battery electric cars and fuel cells technology. He revealed that technological progress alone is not sufficient enough for success of new technology. He discussed factors that may bring radical technological change: new entries, external shocks or crises, performance of the new technology, market changes and industry competition. Van den Hoed (2007) also concluded that there is a little chance that within the next 20 years that traditional inside combustion engines will be replaced by any other technology. This is due to the fact that the latter are much more costly to be manufactured and there is lack of infrastructure to use them. Also, the safety of fuel cell cars is disputable. However, Hensley et al. (2009) argued that sooner or later, electric cars will become a great market opportunity for those who notice it, and at the same time they will be a threat for the automakers manufacturing “traditional” cars. Fournier (2009) claimed that we will soon witness a shift towards a new techno economic paradigm. The fossil fuels-based mobility will be substituted by a mixture of various technologies such as biofuels, electric vehicles, ethanol, rape oil, biomethan, microalgae, hybrid etc.

Perujo and Ciuffo (2010) analysed the possible impact of the electric cars’ recharging activities on the electric supply system for the Province of Milan, and on the global environment with a 2030 time horizon. They concluded that electric cars seem to be very promising in terms of decreasing CO2 emissions and environmental pressures of the road transportation system in general (see also Mayer, 2000). However it is not clear if the pace of development of the electric car market is fast enough to have a significant influence on the car market in next twenty years. Steenberghen and Lopez (2008) stressed that there are obstacles of a structural nature that are disrupting the development of alternative fuels. These obstacles are, among others, lack of infrastructure of filling stations and lack of specific legislation and safety certification. As the risks of investing in new fuel technologies are high, producers are very likely to significantly engage themselves in developing and promoting alternative fuels for road transportation, unless there is a regulatory framework enforcing and supporting the development of new engine technologies. On the contrary, Moriarty and Honnery (2008), after discussing different approaches implemented to tackle environmental problems caused by the car mobility, concluded that there is no technological solution for these problems, and that the world will have to move towards far lower levels of motorised travel.

Notter et al. (2010) performed a study exploring the environmental impact assessment of lithium-ion batteries, which are now the most commonly applied in the electric vehicles. They confirmed earlier studies highlighting that regardless of the energy sources used in the car, the operation phase represents the biggest burden for the environment. In general, the impact of the Li-Ion battery is relatively small. The major contribution to environmental burdens caused by the battery is the supply of copper and aluminium required for the production of the cathode, anode, and the battery pack.

Another important argument questioning the rise and success of new energy sources for car bodies is the fact that customers have poor knowledge of cleaner car technologies and the environmental impacts of road transport (Lane, Potter, 2007). They value car performance, safety, and its innovativeness. Knowledge on the life cycle of an average car is crucial, as it may turn out that redesigning the car results simply in shifting environmental impacts to another phase. For example, Orsato and Wells (2007b) discussed this problem using the steel body of the car as an example: Steel is the main factor influencing the weight of the car, and therefore also determines the energy required to run the car. Steel bodies could be replaced by aluminium bodies. According to aluminium producers, the substitution of one tonne of aluminium for steel in automotive applications would reduce CO2 emission by 20 tonnes over the whole life cycle of an average car. On the other hand it is argued that the production of one tonne of aluminium generates 10-15 times more CO2 emissions than the production of one tonne of steel.

OECD (2004) distinguishes between emissions causing local air pollution and those causing global warming. While the efficiency of combustion engines gets better and air pollution is decreasing, it seems that this is not the optimal solution to fight the problem of global warming, since burning hydrocarbons will always generate CO2 emissions. There exist a variety of possible alternative fuels (LPG, CNG, methanol, bio-fuels), and new technology vehicles (electric, hybrid, fuel cell), but the degree in which these options can reduce emissions while remaining competitive when confronted with conventional technologies is not clear.

Table 5 below summarises environmental issues in the automotive industry

Environmental issues - automotive sector	**Authors/Year**
Green buildings, eco-design, green supply chains, green manufacturing, reverse logistics, innovation	Nunes, Bennett,2010
Packaging and waste reduction, eco-friendly processes and products in the supply chain. raw material decrease, reuse of material,	Thun, Müller,2010
CO2 emissions of cars, affordable mobility	Fournier, 2009
Reduction of air emissions, waste water and solid wastes, decrease in consumption of hazardous/harmful/toxic materials, decrease in frequency for environmental accidents	Zhu et.al., 2007, 2008
GHG emissions from cars	Mayer, 2000; OECD, 2004
End of Life Vehicle	Fergusson, 2007; Smith, Crotty, 2008

Factors stimulating radical technological change (new entries, external shocks or crises, performance of the new technology, market changes and industry competition)	Van den Hoed, 2007
Car life cycle	Orsato, Wells, 2007b
The biggest car manufacturers' approaches to the environmental issues	Steinweg, 2010
Electric cars	Hensley et al., 2009; Perujo, Ciuffo, 2010
Alternative fuels	Steenberghen, Lopez, 2008
Environmental Impact Assessment of Electric Vehicles	Notter et al., 2010

Table 5: Automotive sector: literature on environmental issues

Another important environmental threat from the automotive industry is hazardous chemical substances such as mercury, lead, cadmium, and hexavalent chromium. To face this threat and improve companies' performance in this area, the EU implemented a REACH directive in 2006, which imposed on car manufacturers and all their suppliers' the responsibility to manage risks from chemicals and provide safety information on the substances. Thanks to this, management was improved and companies redesigned their cars to phase out their use of these SVHCs (Steinweg, 2010).

Nunes and Bennett (2010) investigated green operations initiatives in the automotive industry that were documented in the environmental reports of selected companies. They found that car manufacturers are pursuing a wide range of green operations practices such as green buildings, eco-design, green supply chains, green manufacturing, reverse logistics, and innovation. Green supply chain management practices have been investigated by Zhu et al. (2007, 2008). The basic approaches here are: selection of suppliers, transfer of technology, and more efficient logistic systems (e.g. packaging, reduction of empty container travelling). Zhu et al. (2007) found that implementation of GSCM has slightly improved firms' environmental and operational performance, and has not improved firms' economic performance. It has been discussed that the automotive industry witnessed a great shortening of product life cycle (Volpato, Stochetti, 2008). This can be perceived as another factor increasing the negative environmental pressure from the industry.

Study by Sarkis et al. (2010) indicated that training, especially environmental training, is an important factor mediating between stakeholders' expectations and pressures, and various environmental practices. According to the authors, automotive companies are only adopting environmental practices if training programs are in effect. A practical implication of their findings is that another stakeholder (e.g. governmental or regulatory agencies) should constantly analyze a firm's environmental performance. However, the power of the latter to influence company's behavior depends on whether it is primary or secondary stakeholder.

5. Quality of Jobs issues

The automotive industry is characterized by mostly high skilled work with high quality demands. These demands cannot be met with command-and-control job conditions. The result is high pressure on performance and only a limited workforce with low or no skills, which are generally vulnerable to "sweatshop" conditions. This work has generally been sourced out (Hamprecht, 2006; Takeishi, 2002). Different production systems have emerged (reflective, teamwork oriented versus monotonous, line oriented) and provide different pictures of dominant quality of jobs issues. Plus, there are also national differences, although they are merging into company-specific in production systems (Lewchuk, 2001). Therefore, no general trend can be observed.

Table 6 below summarises Quality of jobs issues in automotive industry.

Quality of Jobs issues - automotive sector	**Authors & Year**
Intrinsic work quality	Weichel et al, 2010; Dawal, Taha, 2007; Richardson et al., 2010; Pil, Fujimoto, 2007; Barker, 1993
Skills and employability	Pil, 2007; Berggren, 1993
Health and working conditions	Boraiko et al, 2008; Landau et al., 2006; Winter, 2006; Clarke, 2004; White et al, 2003; Barker, 1993; Graham, 1995; Danford, 1998; Parker and Slaughter, 1988
Flexibility, stability, and security	Jürgens, Krzywdzinski, 2008, 2009
Work-life balance	White et al, 2003;Bond, 1998.
Social dialogue and worker involvement	Sako, 1998; Berggren, 1992; Gorgeu, Mathieu, 2005; Zacharatos et al., 2007; Lewchuk, Wells, 2007
Wages and inclusion	Lewchuk et al, 2001; Wallace, 2000; Zacharatos et al., 2007.

Table 6: Automotive sector: literature on quality of jobs issues.

Intrinsic work quality varies due to different production systems. Reflective production systems (with teamwork and autonomy) tend to have higher job satisfaction, but also considerably higher stress and workload (Gorgeu, Mathieu, 2005; Graham, 1995). Barker (1993) offers a possible explanation for higher stress, showing that concertive control (of a group) tends to exert higher pressure than hierarchy. Line assembly has monotonous and repetitive work with low intrinsic value (Pil, Fujimoto, 2007). The most significant factors on job satisfaction in automotive companies are job rotation, work method, problem solving, and goal setting (Weichel et al, 2010; Dawal, Taha, 2007). However, the notion that reflective production increases employee influence is also contested (Richardson et al., 2010).

Skills and employability offer a mixed picture too. In reflective production systems, training seems to be stronger based on the individual's needs. Other production systems (like the "German"; Berggren, 1993) have more room for job segregation between “Facharbeiter” (with high training) and “Massenarbeiter” (with low or no training) jobs.

Equal treatment: Women are only a fraction of the workforce and tend to occupy lower qualified and paid jobs. Nevertheless, equality issues are neither well researched nor is there evidence of concern from within the industry.

Health and working conditions are of some concern, with emphasis on stress and workload, especially in reflective production schemes (Pil, Fujimoto, 2007; Winter et al., 2006; Parker, Slaughter, 1988; Barker, 1993; Graham, 1995; Danford, 1998 cit in White et al., 2003), enforced by high pressure to cut costs. Further studies deal with ergonomics (Landau et al., 2006) as well as with safety climate and safety culture in car manufacturing plants (Boraiko et al., 2008; Clarke, 2004).

Flexibility, stability and security (with job security and work contracts) are an issue, when moving away from the well-trained, high-skilled “Facharbeiter” to low skill and wage jobs. Whereas in Western Europe these tasks are mostly outsourced, they partly remain in Eastern Europe (Jürgens, Krzywdzinski, 2008, 2009). Nevertheless, the problem tends to increase with workforce separation between permanent and agency contract workers.

Inclusion and access to the labour market is a political concept of quality of work and is not researched.

Work-life balance is scarcely researched. Research and experience from similar sectors (high hours worked combined with high performance practices like team work) suggest possible negative work-to-home spill-over effects. Not astonishingly, flexible working hours tend to reduce this effect, especially with women (Bond et al., 1998; Maume, Houston, 2001; cit. in White et al., 2003). But flexible work arrangements are scarce in shift work.

Social dialogue and worker involvement circles around two phenomena: The rise of lean production and participatory production schemes which openly invite employees to contribute to managerial decisions about production procedures, and benefits vs. costs of union representation. Generally, differences in labour representation (union coverage, union structure) vary nationally, influenced by different regulatory and institutional regimes (Berggren, 1992). Based on a 1994 survey of European automotive plants, Sako (1998) found a strong correlation of performance with direct (quality circles etc.) *and* indirect participation (union representation) of workers in decision making. One case study (Lewchuk, Wells, 2007 on Magna) shows attempts to bypass trade unions with unfavourable consequences on job quality.

Wages and inclusion circle around performance-oriented pay schemes, which were introduced in the course of lean production processes (Lewchuk et al., 2001 on Canada/UK; Wallace, 2000 on Volvo). In a singular meta-study on American carmakers, Zacharatos et al., (2007) found that organization-focused factors like commitment and perceptions of organizational justice have a high influence on performance, whereas person-focused outcomes (like job satisfaction or health) don’t.

6. CSR issues

CSR in the automotive industry comprises a great variety of issues emerging during the production, use and disposal phases. Automotive suppliers should adopt a life-cycle approach paying attention to CSR issues in all stages of their supply (Orsato, Wells, 2007a). The most important subject in this field, however, seems to be the one of alternative technologies and fuels. There exist a variety of possible alternative fuels (LPG, CNG, methanol, bio-fuels) and new technology vehicles (electric, hybrid, and fuel cell). It is unclear which of these options has the ability to reduce emissions and to best compete in the marketplace with conventional technologies. Depending on the circumstances and the attitude towards innovation (radical/incremental), different technologies get chosen, for example a wider adoption of bio-fuels (ethanol) in Brazil, the first hybrid car by Toyota, or the low spread of hydrogen fuel cell technology (Zapata, Nieuwenhuis, 2010).

With the life cycle perspective in mind, the European Parliament and the Council passed the End-of-Life Vehicle (ELV) Directive in 2000. The goal was to reduce waste and improve environmental performance by enhancing end-of-life vehicle recovery. Studies confirm that positive outcomes have already originated from the ELV-directive such as increased rate of recycling, increased hazardous substance removal and improved information dissemination. A more radical approach ("dematerialization") would be needed to generate more radical, ecological design solutions within the automotive industry (Gerrard, Kandlikar, 2007; Smith, Crotty, 2008).

Green supply chain management (GSCM) refers to incorporating ecological aspects into the whole value chain. Usually, companies are aware of the ability of GSCM to increase their economic, social, and environmental performance. However, most economic entities fail to fully capture GSCM potential. An empirical analysis highlighted the status quo of green supply chain management in the German automotive industry - drivers, goals, particular realization and barriers of GSCM – and confirmed the preposition that some GSCM goals were successfully obtained (fulfillment of legal regulations, environmental protection), while realization of efficient resource usage, waste creation, and cost reduction was far from satisfactory (Thun, Muller, 2010). However, being aware of the potential of sustainable business, many firms try to incorporate environmental and social aspects into their supply chain. The Volkswagen management did so by setting normative requirements in relationships with business partners, trying to detect supply related risks early, operationally implementing supply processes, and monitoring and supplier development (Koplin et al., 2007).

Table 7 below summarises literature on CSR issues in automotive industry.

CSR issues - automotive sector	Authors
Recycling techniques, adopting energy efficient technologies, proper use, storage and disposal of hazardous materials, customer environmental compliance, purchasing packaging materials from recycled materials, reduce consumption of non-renewable resources, personal environmental awareness training	Kehbila et, al., 2009
Consuming fewer resources in production processes, developing alternative fuel technologies, environmental efficiency of factories	Zapata, Nieuwenhuis, 2010
Supply chain responsibility (use of raw materials, social or human rights, conditions at the mining level, recycling end-of-life vehicles)	Steinweg, 2010
Green supply chain management	Thun, Müller, 2010; Koplin et al.,2007
Product life cycle, alternative technologies and fuels	Orsato, Wells, 2007a
End-of-life vehicle	Gerrard, Kandlikar, 2007; Smith, Crotty, 2008
Environmental management schemes	González et al., 2008; Beske et al., 2008

Table 7: Automotive sector: literature on CSR issues.

Environmental management schemes are widely recognized and implemented within the automotive industry. However, similar social standards, which would remove hard working conditions, are still missing (Gonzalez et al., 2008; Beske et al., 2008; Kehbila et al., 2009). The most frequent CSR activities among car manufacturers are based on the ILO code (on essential working conditions), companies' individual codes of conduct (CSR policies, and reports), GRI standards, supply chain responsibility, and environmental management systems (Steinweg, 2010).

7. Trends and Future Prospects

The future of the automotive sector will be basically shaped by economic recovery, new software technologies, electric vehicles or other alternative energy propulsion possibilities, and an economic shift toward Asian markets. It is also expected that the automobile industry will be forced to tackle spacial problems like parking and congestion, especially in urban areas.(Vasilash, 2010)

According to Datamonitor (2011), the company car market is expected to show buoyant growth in 2011, and recovery is expected in the second half of the year. In terms of demand, it is forecasted that leasing companies will have purchase more cars this year compared to 2010 due to the improved economy. Therefore car financing will become more readily available and more affordable and leasing companies might expand their geographical coverage again.

As a result of economic recovery and corporate confidence, a growing demand for company cars will be expected. Datamonitor (2011) predicts a compound annual growth rate of 7% between 2010 and 2015, which shows an optimistic outlook for the European company car market. Due to rapid developments in the infotainment market, the automotive industry will need to adapt to growing consumer demands in terms of internet based systems in order to keep up with the market. Harsh competition forces the auto industry to adapt to modern trends. Therefore, it is expected that smartphone connectivity will become a prerequisite in the future. An example for the adaptation of flexibility in software design is the Toyota Entune. Yet, safety features like keyless entry, remote starting, and breakdown recovery are experimented and might influence consumers' demands and enforce competition in the automobile sector. (Taylor, 2008)

Illustrating the economic point of view, Corswant and Frederiksson (2002) claim that there will be a change toward more global operations. That means that car manufacturers and suppliers may increase their production volume and merge with or acquire other car manufacturers. An example of this phenomenon is the merger between Chrysler and Daimler. Yet Asian car manufacturers, particularly India and China, will penetrate into European markets. Furthermore there is an increasing outsourcing trend regarding certain activities to specialized suppliers and companies to be noted. Whereas suppliers increase their outsourcing and globalization of product development activities, car manufacturers do not. To remain competitive, car manufacturers and suppliers continue to reduce product development time and need in order to improve their performance and production.

Corswant and Frederiksson (2002) raised the idea of a tailor-made or individualized car to respond to consumers' demands. Rapid manufacturing technologies allow the possibility to shape and style the components of a car which then should be perfectly matched to the consumers' wishes for "comparable" prices.

Evident trends concerning the efforts of the production of “green cars” can be identified. Next to escalating fuel prices, the European regulations on carbon reduction are also reasons for the need for green cars. Alternatives to gasoline propulsion are therefore considered, like making cars and trucks more energy efficient through hybridization, electrification, or other fuels. Hereby, it has to be considered that drivers are still reluctant to buy electric cars because of high initial purchase cost, a lack of charging points, and short travel ranges. Hence, technology has to improve in terms of the user-friendliness of electric cars. Also, the use of material has to be thought over in order to tackle the problem of waste management and resource efficiency. (Vasilash, 2010)

The ideas of multiple transportation modes opportunity, like hybrid transportation modes, road-air, smart grids for electric vehicles, and road-water have also been proposed. Seidl et al. (2005) forecasted the business opportunity of brand extension into unrelated markets so that car manufacturers extend their brands to other consumer product categories that include, among others, brand financial, lifestyle, entertainment, and communication products. However, these assumed business opportunities, as well as the idea of the tailored car, are models which would take a decade or even more to be developed.

In summary, it can be stated that the main trends in the car industry will be about over-capacity, increasing customer requirements, tougher environmental legislation, and rapid technology development.

Trends and Future Prospects- Automotive Sector	Authors	Year
Sourcing trends, motor industry, outsourcing, supplier relations	Corswant, Fredriksson	2002
Economic outlook for the automobile industry and vehicle manufacturers, market penetration, business development, and forecasting	Datamonitor	2011
Automotive future, Industry Transformations, consumer behavior, business opportunities for the future	Seidl, Loch, Chahil	2005
Forecast predictions of the development of the global car industry	Taylor	2008
Future trend to electric networked vehicle, expected growth of automobile industry	Vasilash	2010

Table 8: Automotive Sector: literature on future trends

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9. Annex

The following table shows the automotive sub-sectors according to NACE 1.1 version

Sector	NACE 1.1	Sub-sector
Automotive	34	Manufacture of motor vehicles, trailers and semi-trailers
	34.1	Manufacture of motor vehicles
	34.10	Manufacture of motor vehicles
	34.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
	34.20	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
	34.3	Manufacture of parts and accessories for motor vehicles and their engines
	34.30	Manufacture of parts and accessories for motor vehicles and their engines

The following table shows the automotive sub-sectors according to NACE 2.0 version

Sector	NACE 2.0	Sub-sector
Automotive	C29	Manufacture of motor vehicles, trailers and semi-trailers
	C29.1	Manufacture of motor vehicles
	C29.1.0	Manufacture of motor vehicles
	C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
	C29.2.0	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
	C29.3	Manufacture of parts and accessories for motor vehicles
	C29.3.1	Manufacture of electrical and electronic equipment for motor vehicles
	C29.3.2	Manufacture of other parts and accessories for motor vehicles
	C30	Manufacture of other transport equipment
	C30.1	Building of ships and boats
	C30.1.1	Building of ships and floating structures
	C30.1.2	Building of pleasure and sporting boats
	C30.2	Manufacture of railway locomotives and rolling stock
	C30.2.0	Manufacture of railway locomotives and rolling stock
	C30.3	Manufacture of air and spacecraft and related machinery
	C30.3.0	Manufacture of air and spacecraft and related machinery
	C30.4	Manufacture of military fighting vehicles
	C30.4.0	Manufacture of military fighting vehicles
	C30.9	Manufacture of transport equipment n.e.c
	C30.9.1	Manufacture of motorcycles
	C30.9.2	Manufacture of bicycles and invalid carriages
	C30.9.9	Manufacture of other transport equipment n.e.c

The EU biggest companies from the automotive sector in 2009

	Company name	Country	NACE 2.0 code
1.	VOLKSWAGEN AKTIENGESELLSCHAFT	DE	2910
2.	DAIMLER AG	DE	2910
3.	PEUGEOT CITROEN AUTOMOBILES SA	FR	2910
4.	BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT	DE	2910
5.	ROBERT BOSCH GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG	DE	2932
6.	RENAULT	FR	2910
7.	AUDI AKTIENGESELLSCHAFT INGOLSTADT	DE	2910
8.	RENAULT SAS	FR	2910
9.	BAE SYSTEMS PLC	GB	3030
10.	FIAT GROUP AUTOMOBILES S.P.A. O BREVEMENTE FIAT AUTO S.P.A.	IT	2910
11.	FORD-WERKE GMBH	DE	2930
12.	ROLLS-ROYCE GROUP PLC	GB	3030
13.	ADAM OPEL GMBH	DE	2910
14.	AUTOMOBILES PEUGEOT	FR	2910
15.	FORD ESPANA SL	ES	2910
16.	VOLVO PERSONVAGNAR AB	SE	2910
17.	SA AUTOMOBILES CITROEN	FR	2910
18.	FORD MOTOR COMPANY LIMITED	GB	2910
19.	ŠKODA AUTO, A.S.	CZ	2910
20.	AIRBUS OPERATIONS GMBH	DE	3030
21.	SCANIA CV AB	SE	2910
22.	AIRBUS OPERATIONS SAS	FR	3030
23.	PEUGEOT CITROEN AUTOMOVILES ESPANA SA	ES	2910
24.	SNECMA	FR	3030
25.	FIAT AUTO POLAND S.A.	PL	2910
26.	GKN HOLDINGS PLC	GB	2932
27.	GKN PLC	GB	2932
28.	SEAT SA	ES	2910
29.	GENERAL MOTORS ESPANA SLU	ES	2910
30.	NISSAN MOTOR MANUFACTURING (UK) LIMITED	GB	2910

Source: Amadeus data base

Sectoral Institutions and Initiatives

- EU High Level Group Cars 21 (http://ec.europa.eu/enterprise/sectors/automotive/competitiveness-cars21/cars21/index_en.htm),
- European Association of Automotive Suppliers (www.acea.be),
- European Council for Motor Trades and Repairs (www.cecra.eu),
- European Union Road Federation (www.erf.be),
- European Transport Workers' Federation (www.itfglobal.org/etf/index.cfm),
- European Road Transport Research Advisory Council (www.ertrac.org/en/),
- The European Group of Automobile Recycling (www.egaranet.org),
- Association of Automotive R&D Organisations (www.earpa.eu),
- Natural Gas Vehicles Association (www.ngvaeurope.eu),
- Association for European Transport (www.aetransport.org),
- Competitive Automotive Regulatory System for the 21st century (http://ec.europa.eu/enterprise/sectors/automotive/competitiveness-cars21/cars21/index_en.htm),
- DG Climate Action: Reducing CO2 emissions from light-duty vehicles (http://ec.europa.eu/clima/policies/transport/vehicles/index_en.htm)

Major European legal frameworks relevant to the sector

EU legislation affecting environmental issues

- Regulation (EC) n° 79/2009 on type-approval of hydrogen-powered motor vehicles
- Regulation (EU) No 406/2010 implementing Regulation (EC) No 79/2009 on type-approval of hydrogen-powered motor vehicles
- Regulation (EC) n° 443/2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles
- Regulation (EC) n° 692/2008 implementing and amending Regulation (EC) n° 715/2007 on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information
- Regulation (EC) n° 715/2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance
- Regulation (EC) No 595/2009 of the European Parliament and of the Council of 18 June 2009 on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (Euro VI) and on access to vehicle repair and maintenance information and amending Regulation (EC) No 715/2007 and Directive 2007/46/EC and repealing Directives 80/1269/EEC, 2005/55/EC and 2005/78/EC Regulation (EC) No 595/2009 (Euro VI Regulation) setting emission limits for heavy duty-vehicles
- Regulation (EC) n° 692/2008 implementing and amending Regulation (EC) n° 715/2007 on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information
- Regulation (EC) n° 715/2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance
- Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS),

- Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH),
- Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles,
- Directive 2008/1/EC of the European Parliament and of the Council concerning integrated pollution prevention and control (IPCC),
- Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community,

EU legislation affecting quality of work

- Directive 91/533/EEC on an employer's obligation to inform employees of the conditions applicable to the contract or employment relationship,
- Council Directive 1999/70/EC of 28 June 1999 concerning the framework agreement on fixed-term,
- Council Directive 97/81/EC of 15 December 1997 concerning the Framework Agreement on part-time work,
- Directive 2008/104/EC of the European Parliament and of the Council of 19 November 2008 on temporary agency work,
- Directives aimed at improving health and safety at work: 89/391 (Framework), 89/654 (Workplaces), 89/655 (Work Equipment), 89/656 (Personal Protective Equipment), 90/269 (Manual Handling of Loads) and 90/270 (Display Screen Equipment), Directive 91/383/EEC,
- Council Directive 94/33/EC of 22 June 1994 on the protection of young people at work,
- Directive 2003/88/EC of the European Parliament and of the Council of 4 November 2003 concerning certain aspects of the organisation of working time,
- Directive 96/71/EC of the European Parliament and of the Council of 16 December 1996 concerning the posting of workers in the framework of the provision of services,
- Directive 2008/94/EC of the European Parliament and of the Council of 22 October 2008 on the protection of employees in the event of the insolvency of their employer,
- Council Directive 2001/23/EC of 12 March 2001 on the approximation of the laws of the Member States relating to the safeguarding of employees' rights in the event of transfers of undertakings, businesses or parts of undertakings or businesses,
- The Framework on Information and Consultation (Directive 2002/14/EC) grants basic principles, definitions and arrangements for information of employees at the enterprise level,
- Council Directive 98/59/EC of 20 July 1998 on the approximation of the laws of the Member States relating to collective redundancies.

Databases relevant in the sector

5 major European databases exist on job satisfaction, which meet the restrictive criteria: European in scope, periodically updated and statistically representative. They are not sector specific.

- European Labour Force Survey (ELFS),
- European Working Conditions Survey (EWCS),
- European Survey on Income and Living Conditions (EU-SILC),
- European Structure of Earnings Survey (ESES),
- International Social Survey Programme (ISSP).