Sales Management and Its Role in the New Era of Upcoming Emission Standards

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Abstract

A growing demand for emission standards to meet the essential ecological criteria creates a difficult situation for car manufacturers, with which they must cope in the coming years. However, the above-mentioned situation can be looked at from another perspective. It uncovers an incredible number of opportunities that carmakers should use and, as a result, offer their customers an alternative product to fully satisfy their needs. The aim of this thesis is to provide an insight on how the car companies are currently trying to benefit from this situation and whether their approach is consistent with the expectations of their potential clients.

Keywords: automotive industry, emission standards, sales marketing, sustainable energy source.

Contents

INTRODUCTION

The global economy has been affected by several development phases, several of which occurred cyclically, also with regard to global economic cycles, mainly of continental character. Among these cycles, the global economy has experienced its better and worse times. This economic development inevitably manifests itself and continues to do so in terms of the industry in individual sectors. One of these sectors is the automotive industry. It can rather be included among the sectors which are affected by the potential fall of the economy into recession, than the sectors where a potential crisis can happen for far fewer reasons. It might be said that the product of the automotive industry is a commodity which a large proportion of customers buys only when they are not threatened by their economic situation, and the purchase of this product happens mainly for three reasons: a) a real necessity, when an individual or an entrepreneur feels a real need to buy a vehicle due to the increase of their activities, whether private or business, b) the second reason is when the need to buy a new vehicle is evoked by the pressure of having to raise their social and economic status. Both of these cases are quite common in times of economic growth. If the economy falls into recession the quantity of these cases decreases dramatically and the automotive industry product is purchased only is the most urgent situations i.e. c) the necessary exchange of an old vehicle for a new one due to the technical upgrade. The truth of that assertion is supported by the analysis of customer behaviour during the last global economic crisis of 2008 when the volume of global car sales dropped dramatically and many automakers faced major complications.

The real estate market, the financial sector, and many others struggle with similar problems. These problems have one common cause. The product of these sectors is not of vital need and the customer can easily abstain from buying them. The opposite can be said about, for example, the food industry, since the purchase of food is vitally important for everyone, and even if the customers are looking for more affordable goods, they still must buy a product of this sector.

Not until the recession can be seen which company is viable and which is not. It is similar in the automotive industry, where the latest crisis has shown who is ready for changes. In times of change, it is very important for any company to be able to find the necessary market and the consumer who is willing to spend their money on the offered product. This is what determines whether the company can make a profit, survive, retain employees, or the life of

the company becomes 'limited' or terminated. The system, which is intended to cope with this challenge, will be further referred to as the Sales Management (SM). In every society, SM needs to be considered as the most important tool, which results in a stable position on the market in any economic situation. In the automotive industry, Sales Management is all the more important as, along with economic development, its strategy includes a number of legislative and technical requirements, which are reflected in the continuously tightening technical and legal rules and standards of safety and ecology. The changes in these departments directly concern every factory in the automotive industry, from the most important to the very last process of this industry. This means, that SM of these companies cannot disregard these changes and must directly adapt its policy to the changing conditions. The competition of car producers is high in all aspects and every business seeks to somehow differ from the others and the sales strategies have the task of fully meeting the needs of its customers. The most fundamental of them is the fulfilment of the above-mentioned regulations and standards, which are a guarantee of quality for the customer. The topic of the recent years has been a question regarding the configuration and fulfilment of emission standards. This question together with global environmental problems is currently the most urgent. In light of the changing situation in this area, the automotive producers are forced to strengthen the production processes and increase the quality of their products. This also becomes a challenge, but in the case of successful management, it can become a certain weapon in the hands of the sales managers of these production companies. This thesis, therefore, will deal with SM of individual car producers, which have been included in the category of large enterprises, and SM will be seen as a stand-alone system, responsible for all sales strategies of those enterprises.

The aim of this thesis is:

- analysis of sales management issues in an unexpected situation (in terms of technical failure of the product / production and thereby endangering the production company),
- processing the methodology of research on the continuously tightening standards in the field of vehicle emissions, and the way they influence the sales management strategies of the world's top automotive companies.
- analytical evaluation of policy changes and assessing the impact on marketability and economic results, including a customer questionnaire survey,

- evaluation of the steps in the reduction and limitation of harmful emissions from motor vehicles and other possible measures in form of several recommendations for functioning improvement of SM of global automakers.

The focus of this work is currently a topical subject. It is not so purely due to the recently finished economic crisis, or because of the last known incidents of emissions fraud (discussed mainly in 2015/2016), but also due to the fact that this sector accounts for almost 45% of GDP of the Slovak industry with an expected rise forecast. For many supply companies, it is also an inspiration to learn from the mistakes of the past work hard in developing new products and production after 2020.

The thesis aims at answering the fundamental questions which, due to a tightening emission legislation, automatically arise in relation to the SM. The results of the examination of the theme have to provide a view on whether the continuous tightening policy goes hand in hand with research and development of new ecological opportunities in the segment of automotive transportation, or this relationship is uneven. In this respect, it will show the way individual car manufacturers respond to this development and how they cope with political pressure to reduce emission loads on the one hand and the requirements of the customers on the other. Finding a balance between the two sides of the spectrum is directly reflected in the automotive sales strategy. The objective of this thesis is to assess whether the vehicle manufacturers found in the area of SM the right recipe that meets the strict criteria of both parties. The thesis aims to find the hidden reserves and, having analysed the issue to provide a set of recommendations to improve the aforementioned balance.

1 THEORETICAL BACKGROUND OF RESEARCH

1.1 Sales Management - theoretical background

1.1.1 Definition of Sales Management

Sales management is a specific tool for business by means of which the company is trying to sell their products in the largest quantities and at the most favourable prices from the perspective of both the seller and the customer (*Docurated* 2016).

Sales management is thus a business function, the mission of which is the commercialization of goods and services on the most appropriate terms, on condition of awareness of the attitudes to the product, market characteristics, development plans, sales budgets and other necessary variables. At present, it is in the first place in the commercial considerations of enterprises and is the principal basis of the market economy. Under certain conditions, SM can assess the years of research, product concept development, production or marketing communications. In practice, it is not a complex activity, but it certainly requires careful and detailed preparation (Kita 2002: 177).

A highly apt definition of sales management is a description that says *"sales management can be defined as the business discipline that focuses on improving the practical application of sales techniques, processes, systems, and operations in order to increase revenue. Sales managers occupy one of the most important positions with the entire company. Sales managers are judged on their ability to generate revenue for the company. If they fail to reach their quota, they will swiftly be shown the exit door"* (*Docurated* 2016).

In any market, every business is literally dependent on the customer. This is also true in the automotive industry. Individual car companies optimize the ways in which they could get more customers. Success in sales is not solely a result of luck and favourable circumstances. Success stands on several pillars. The primary one is a top quality sales strategy, which reflects the peculiarities of the market and accounts for any unforeseen circumstances.

1.1.2 Relationship between Marketing and Sales management

The modern SM refrains from the tactics of personally addressing all customers and does not work with them as individuals. The most effective way, which a growing number of enterprises apply in the automotive industry, is working with the clients as specific groups. This system does not mean distinct differences between these groups, they are only differentiated by subtle changes that indicate their potential buying behaviour (Gammon 1994: 105).

The Sales management itself is closely related to marketing management, which is defined as *"a social and managerial process which satisfies the needs and desires of individuals and groups in the process of production and changing the product and values"* (Kotler 2007: 39), *or as a management process responsible for identifying, anticipating and satisfying customer requirements in making a profit"* (Janečková 2000: 22). Under these definitions, it can, therefore, be said that the marketing implies also a research, with which the customers' needs and their subsequent reaction is understood, which consists of providing the product or service that is actually necessary. This is precisely the hidden close link between the actual sales and marketing, as both these tools overlap in many cases. They both have a common goal of a satisfied customer. This suggests that marketing is not mere advertising that must result in the sale of goods and services "at any cost", but it is a set of activities, meant to help a company find a product form worth producing or offering, that would benefit not only the company but primarily the customer. Whereas marketing focuses more on pre-sales activities, which serve to identify the needs of customers, sales management is closely related to these processes as it carries out business relationships with customers and sales.

Marketing and Sales Management include the following processes:

- Marketing research (market research, pricing research),
- Marketing planning,
- Sales upturn (developing and updating the product, pricing policy)
- Business and product promotion,
- Marketing concept of enterprise (Kupkovič 2001: 225),
- Brand Management,
- Sales,
- Customer Relationship Management,

- Customer care.

The main mission of the seller is sales, which would result in orders and volume growth of the realized turnover. All of that is done through the following phases:

- Identification of the customer,
- Presentation and demonstration of the product,
- Economical aspects of sales,
- Closing the purchase.

1.1.3 Sales management strategies

While marketing is a classic pre-sales approach which creates a suitable fertile ground for vendors, sales phases focus on acquiring and gradually establishing the customer relationship. In order for the company to survive the strong competition, it is necessary to determine realistic goals for sales and look for the means of achieving them. A set of these goals and means can be called a sales management strategy, or otherwise marketing strategies.

Marketing strategy is a certain set of rules to be followed in order to provide a set objective. Sales is a very important process and "as any important process in the company, sales also must follow certain rules. The sale is a process which shows that business cannot exist without customers. Thus, for sales to happen, a company must make an effort to find customers who are satisfied with their products and will maintain a long-term relationship with the company" (Kita 2002: 306).

The marketing strategy must be consistent with all partial strategies of the enterprise, as together they form the skeleton of a core business strategy. Whereas marketing is based on the currently known facts, sales must look much further forward. A company would inevitably have to build a strategy for business which would also include the customers' expectations of the product or service they are planning to buy. It is also necessary to develop a prognosis for the future, alongside the regular market analysis. The strategy must consist of a number of strategic plans which are based on a larger number of situations that can really happen on the market.

The modern marketing concept is understood more broadly and contains several key areas:

- Sales plan (creation of the best possible strategy),
- Sales survey (finding the customer),
- Marketing stages (relationship development),
- Maintaining relationships after the sale (to ensure customer satisfaction and give them a reason to maintain a long-term relationship with the company) (Kita 2002: 179).

As long as the company wants its sales strategy to work, it must follow the steps that cover all the above-mentioned areas. The most important aspect is a sales plan, which determines the strategy of searching for the target audience for a particular product. The main steps in this area are the definition of the product, determination of its price and method of its distribution. Subsequently, based on market analysis and analysis of business opportunities, the expected revenue from the sales can be calculated. Based on the results of the sales, the customers are found and contacted. The first step is to ask questions such as "What am I selling?", "Who is my customer?", "Why does my customer buy or does not buy my product?" and so on. The answers to these questions help to assess customer behaviour and adapt the sales method to it, in order to obtain the necessary range of customers. After potential customers are found, such a relationship with them is built so as to ensure that the trade actually occurs. Having concluded the trade, a correct relationship with the customers is maintained, which would stimulate their return to the company in the future. Direct marketing is also a particularly suitable instrument.

A very important variable in developing sales strategies and planning is the competition. The competition affects these plans significantly. This fact must be accounted for in the sales strategy so that the business is capable of overtaking a wide range of competitors. Being successful implies that one can satisfy the demands and needs of customers better than competitors. Businesses must gain a strategic advantage which can persuade target consumers. This advantage is built by means of a clear definition of their own market position to offer competitive deals (Kotler 1990: 104).

A suitable instrument of strategic management, which helps not only to determine the position of competition in the market but also to get to know the society better, is called benchmarking (*Innovation portal* 2016). Benchmarking helps to find the answer to the most important questions of the company's strategy which is "What to do to make the company successful in business?". The result should be the answer to "How much does it need to be

improved?" and "How to improve it?". In other words, "benchmarking is an approach by which we so modestly admit that someone else is better at something, and then we are smart enough to find the way to become equally good, or even better" (Široký 2006: 4).

The purpose of benchmarking is to find the true position of the company in the market in comparison with its competitors, by means of evaluation indicators and the impact of the company activity on the customer. Also, the efficiency of work is estimated through evaluation of finance, personnel, service levels, product quality and so on. Then the ways to work better and more efficiently are investigated. This means, that benchmarking helps to research the hidden reserves of one's own business. All the major automakers worldwide use the system of benchmarking.

Benchmarking motivates the company to implement positive changes in many sectors. By analysing how to enhance the performance of all branches of the company, it causes innovation and development (Tidd, Bessant 2014).

1.2 Global analysis of automotive industry sector

1.2.1 A general view of the researched sector

The automotive industry is a sector which in the last hundred years or more has witnessed the extensive development of innovative technologies, the integration of many processes and a continuing growth of the product range. It is ranked worldwide among the industries with the highest turnover. Slovakia is the country which has just begun to call itself the "Automobile country" mainly thanks to the investments of several world-famous car manufacturers. Their new destinations which are located in Slovakia enrich the production of many popular types of vehicles – from mass-produced to the sports and luxury vehicles. The definition of car manufacturing is enlisted in the classification of economic activities SK-NACE in Slovakia, where it is classified in subsection 29 as follows:

- *"29 Manufacture of motor vehicles, trailers, and semi-trailers*
  - *29.1 Manufacture of motor vehicles*
    - ✓ *29.10 Manufacture of motor vehicles*
  - *29.2 Manufacture of bodies for motor vehicles; manufacture of trailers and semi-trailers*

- ✓ *29.20 Manufacture of bodies for motor vehicles; manufacture of trailers and semi-trailers*

➢ *29.3 Manufacture of parts and accessories for motor vehicles*

- ✓ *29.31 Manufacture of electrical and electronic equipment for motor vehicles*
- ✓ *29.32 Manufacture of other parts and accessories for motor vehicles"* (*Financsprava* 2007).

The automotive industry certainly does not merely include the actual production of motor vehicles and their parts, it also covers a wide range of other industrial and commercial activities, which manufacturing enterprises perform themselves at their own expense or through their subcontractors. To provide an example, it can be mentioned that the automotive industry is closely linked to industries such as mechanical engineering, metallurgy, chemical, textile, glass and more. It also cooperates very closely with the financial sector, for example, in areas of finance, insurance and the like.

The automotive industry can be called "the king of industries". The production of cars is in fact only the summit, preceded by a variety of production stages. Many suppliers of parts and components from other industries take part in production on these stages. This sector is undoubtedly an important one, as seen by the ever-growing interest of legal entities and individuals. This is what forces the car manufacturers to ensure that the sector is continuously in motion. This means that the manufacture of new cars must incorporate the new knowledge, and apply innovative procedures which result from industrial research and development in the production. The cars of today can be compared to a kind of research labs which incorporate the development of various electronic, software, design, environmental and safety features. Innovation is, in fact, a key aspect of today's automotive industry.

According to European Commission, "[t]he automotive industry is crucial for Europe's prosperity. The sector provides jobs for 12 million people and accounts for 4% of the EU's GDP [gross domestic product of the European Union]. The EU is among the world's biggest producers of motor vehicles and the sector represents the largest private investor in research and development (R&D). To strengthen the competitiveness of the EU automotive industry and preserve its global technological leadership, the European Commission supports global technological harmonisation and provides funding for R&D. 80% of the growth in the sector is expected to occur outside the EU. The EU's efforts should focus on concluding and

enforcing preferential trade and investment agreements. These will make it easier for European companies to access third markets and continue benefiting from economies of scale" (*European Commission* 2016a).

1.2.2 The history of the automotive industry

The beginning of the automotive industry dates back to as far as the 18th century, when in 1776 the first steam-powered automobile was built by Nicolas Joseph Cugnot. The development continued further, as the automobiles were constantly improved and their speed kept increasing. In 1836 a German Brackenburg produced the first vehicle with a combustion engine, which, however, was dangerous and had various flaws. Its engine burnt hydrogen with pure oxygen. Afterwards, in 1862 a Frenchman Alphonse Beau de Rochas invented the four-stroke internal combustion engine, but the project remained only an idea since the machine was patented, but never built. The first internal combustion engine was set in motion by Nicolaus August Otto. In 1886 Karl Benz and Wilhelm Maybach together with Wilhelm Daimler independently from one another built and put into operation a set of new vehicles propelled by an external ignition (Paturi 1993: 322-323).

The emergence of Karl Benz's automobile is considered to be the origination of the automobile industry. For the time, these vehicles were produced and sold in large quantities. At this point, a German Rudolf Diesel has to be mentioned, who also significantly influenced the global development of motor vehicles. It was he who in 1897 developed a new type of engine that operated on the principle of self-ignition of fuel in the cylinder by means of the heat generated under pressure. Compression (Diesel) ignition has proven its worth and is still preferred to spark-ignition engines (petrol) by many. Until the beginning of the 20th century, a car was a luxury and a kind of "toy for the rich". However, an American Henry Ford broke down all barriers in this area and made cars available to ordinary citizens by introducing mass production. While the price of the car had been previously estimated above $2,000, thanks to Ford, the price dropped to just $850. In 1927 the price of Ford's car was only $300, and during that time Ford sold more than 15 million units of these cars (Šimončič 2012).

In the 30s of the previous century virtually all currently used mechanical parts and technologies had been already developed and were gradual, in terms of materials and technological possibilities, being improved. World War II shifted the focus of the automotive

industry, mainly onto the production of military vehicles (*Encyclopedia Britannica Online* 2016). On the other hand, the war also caused major damage to the automotive industry, from which it eventually recovered. A new concept of car design appeared at the end of the 40s. Some of its features remain to this day (e.g. self-supporting body). At the beginning of the 50s interest in smaller and cheaper cars like Lloyd 300 or BMW Isetta appeared in Europe (*Encyclopaedia Britannica Online* 2016).

In the early 60s, efficient cars with rear-wheel drive became popular, in particular in the USA. The arrival of the 70s signified a change of the situation, bringing interest to less powerful and more fuel-efficient vehicles. In addition to this change in the mindset of car users, the 70s also brought new technologies such as independent suspension and electronically-controlled fuel injection. Other than that, other types of materials started to be used such as plastic, which replaced the previously used steel and wood. An important step was equipping vehicles with the catalytic converter. Such a vehicle was sold in Europe for the first time in 1985. This required the use of unleaded petrol in vehicles with spark ignition engines, and its primary task was to reduce the rate of car emissions. In addition, vehicles equipped with on-board computers started to appear on the market (Paturi 1993: 512-578).

At the end of last and the beginning of this century, the modernization of various types of cars was mainly a matter of design, and this principle has caused the emergence of new segments of cars. The beginning of the new millennium was and still is characterized by the attempts to optimize consumption and CO2 emissions. In recent years, automobile manufacturers have come up with lots of new products which are intended to achieve the set objectives, while also satisfying the demands of the customers. All preventive measures such as reducing the weight of vehicles, reducing engine capacity, equipping the vehicles with additional systems are described in greater detail in the next section of this paper.

1.2.3 Global characteristics of the automotive industry in the European Union

As mentioned above, the European Union is currently considered to be the most important player in the automotive industry. It is, therefore, appropriate to evaluate the contribution of this sector to the economy of this community using a set of global characteristics. Due to the required size of this thesis, out of many global parameters, we will discuss only those which clearly demonstrate the growth of the industry on a global scale, resulting in growing demand for fulfilling the strict emission standards. First of all, it is necessary to look closely at the

"balance of power" in the automotive industry across the European Union. It is best to map out the layout using the diagram below.

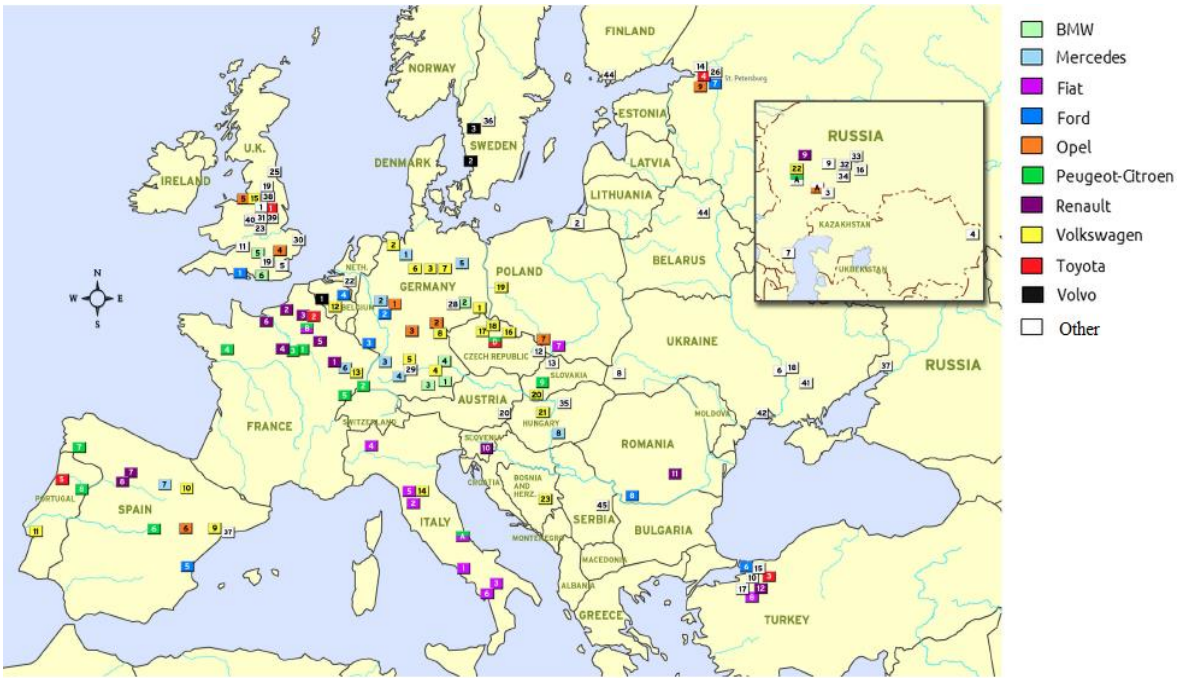

Figure 1 Map of automobile manufacturing plants in the European Union (*Europe autonews* 2012)

Production of EU automotive industry

The first criterion, which helps to evaluate the development in the automotive industry, is its production. In 2015 the EU produced more than 18.4 million cars, which is more than 23% of the total 91.5 million cars produced each year, thus becoming the leader of global car producers in terms of a number of units per capita. In terms of overall production, it is currently in the second place. It is interesting to know that just in the early 20th century 80% of global production of cars was contributed by the USA (*OICA* 2015).

Table 1 - Production of the world's largest producers of cars per year, years 2010-2015 (Made by author according to the source *OICA* 2015)

Country/year	2010	2011	2012	2013	2014	2015
EÚ	17 078 825	17 522 340	16 275 525	16 246 974	17 127 469	18 177 481
USA	7 743 093	8 561 535	10 335 765	11 066 432	11 660 702	12 100 095
China	18 264 761	18 418 876	19 271 808	22 116 825	23 731 600	24 503 326
Japan	9 628 920	8 398 630	9 943 077	9 630 181	9 774 665	9 278 238
World	77 583 519	79 880 920	84 236 171	87 354 003	89 776 465	90 780 583

There is a direct correlation between the growth in the total population of humanity and the gradual growth in demand for cars of different classes and parameters. The growth in demand and thereby increase of production on a global scale is evident from the table above, which can be shown graphically. The graph shows that the production of vehicles of all major players has had an upward trend, with the exception of Japan, where it is still on a more or less break-even level. The figure also displays the impact of the global economic crisis, when in 2010 the production did not vary much and the most visible growth occurred only after 2011 (*OICA* 2015).

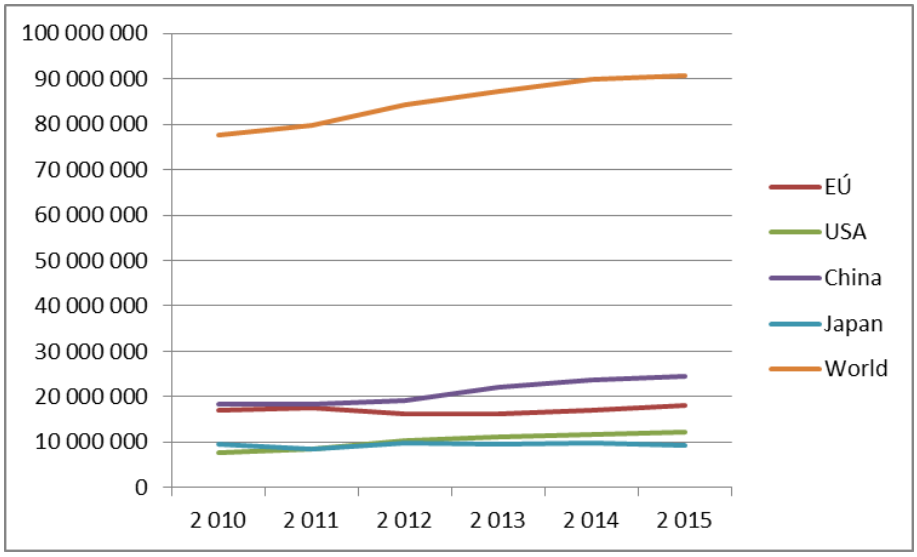

Figure 2 Graphical representation of the car manufacturing by the world's largest producers for years 2010 - 2015 (*OICA* 2015)

Employment in the automotive industry

Currently, the automotive industry in the EU creates jobs for a total of more than 12 million of its inhabitants, nearly two million of whom work directly in the car manufacture and assembly, and the rest work in sales, maintenance and transport (European Commission 2016a). In comparison, for example, in 2015 in the US the automotive industry employed a total of 7,250,000 employees, more than 1.5 million of whom contributed directly to the production and assembly of the vehicles (*Auto alliance* 2015).

The factual data of the following figure show the structure of employment in the automotive industry of the EU, for the years 2008 - 2013, which illustrates the sectors of the influence of the automotive industry.

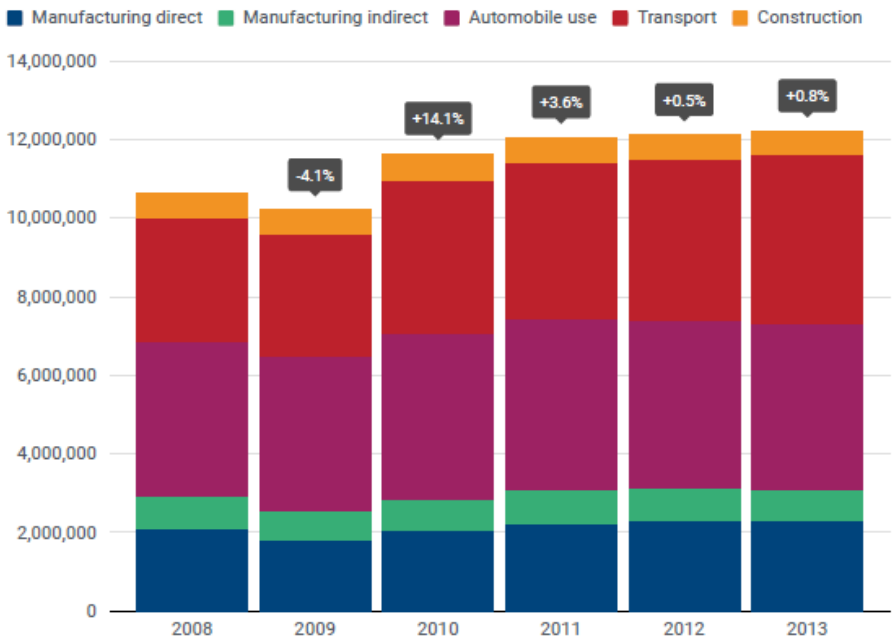

Figure 3 The structure of employment in the automotive industry of the EU, for the years 2008 – 2013 (*Acea* 2015a).

Export and import of the automotive industry

Export and import, to and from a particular country together create international trade. The comparison of the balances of export and import over a certain period of time will result in a foreign trade turnover (*Investopedia* 2016). This mechanism also applies to the automotive industry.

It is clear from Table 2 that the export of cars manufactured in the EU greatly outweighs their import. This data confirms the fact that the EU produces the highest number of vehicles per capita, creating the production surplus. The positive difference in favour of export is planned and causes a high rate of added value share of the automotive industry compared with the total added value of the EU. Within the EU this indicator has been in the range of 5%. The United States and China are among the largest purchasers of vehicles manufactured in the European Union. More than 24% of total EU production was exported to the United States in 2014 and more than 18% in 2015. An even larger number of vehicles the EU exported to China - 30% in 2014 and up to 41% in 2015. Conversely, the most popular cars imported to the EU are vehicles originating from Japan. In recent years the EU imported about 20% of cars from this country (*Acea* 2015b).

Table 2 - Import and export of automotive industry of the EU in the years 2014 – 2015 (Made by author according to the source *Acea* 2015b)

2015	PC*	LCV**	CV + BC***	Total
Imports	32,488	5,003	1,560	39,051
Exports	129,104	3,957	6,382	139,443
Trade balance	96,616	-1,046	4,822	100,392
2014				
Imports	26,203	3,973	1,136	31,312
Exports	114,993	3,922	6,236	125,151
Trade balance	88,789	-51,000	5,100	42,889
% change 2015/2016				
Imports	24,0%	26,0%	37,4%	24,7%
Exports	12,3%	0,9%	2,4%	11,4%
Trade balance	8,8%	1951,2%	-5,5%	7,0%

* - Passenger cars
** - New light commercial vehicles
*** - heavy commercial vehicles, buses, and coaches

1.2.4 Automotive industry in Slovakia

At present, the automotive industry is a key sector of the Slovak economy. It is beneficial not only in the direct production but also by generating positive effects from subcontracting. Due to the arrival of two major automotive manufacturers, particularly over the last decade, the automotive industry in Slovakia has become a sector which has the highest share within the industrial branches, in export and employment. Whereas until 2006 the only manufacturing and assembly plant in Slovakia was Volkswagen, in 2006 two other automakers - Kia Motors and PSA Peugeot Citroen started to fully operate in Žilina and Trnava. This event turned Slovakia into "automotive power" (Liptáková 2015).

Slovakia is now ranked among the top twenty global producers of cars, thus overtaking even such countries as Italy or the United Kingdom. While in 2000 Slovakia did not produce even 200,000 cars, the number of cars produced in 2007 was around 500 000. In 2015 Slovakia produced a million of cars per year. The development in the field of automotive industry in Slovakia in 2006 - 2016, performed by the individual car manufacturers, is captured in Figure 4.

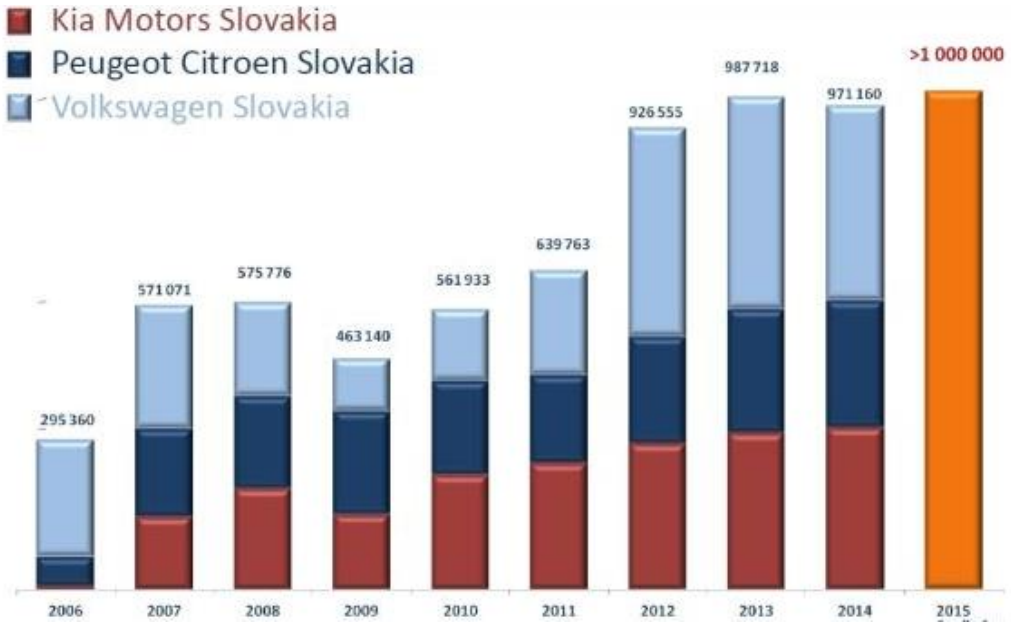

Figure 4 Development of car production in Slovakia for the years 2006-2016 (*Autobild Slovensko* 2016)

The added value of the automotive industry reached a mere 400 million euros in 2000, while today it is more than 2.5 billion euros. The automotive industry in Slovakia directly employs 80 thousand employees by means of three car producers and their direct suppliers. Moreover, the industry indirectly created more than 120 thousand other jobs. The automotive industry accounts for 43% of the overall industrial production. It also contributes 35% to the total national export. In financial terms, it means 17 to 22 billion euros annually in the period of 2013-2016 (*Sario* 2016).

As seen in Figure 5, today the Slovak Republic is the leader of all statistics of the total production of cars per capita. This trend is likely to escalate in the future, as another major investor, Jaguar Land Rover, announced entry to Slovakia. The agreement with the government of Slovakia was signed at the end of 2015. The development in the production of vehicles is expected to reach 1.35 million vehicles per year by 2020 (*Autobild Slovensko* 2016).

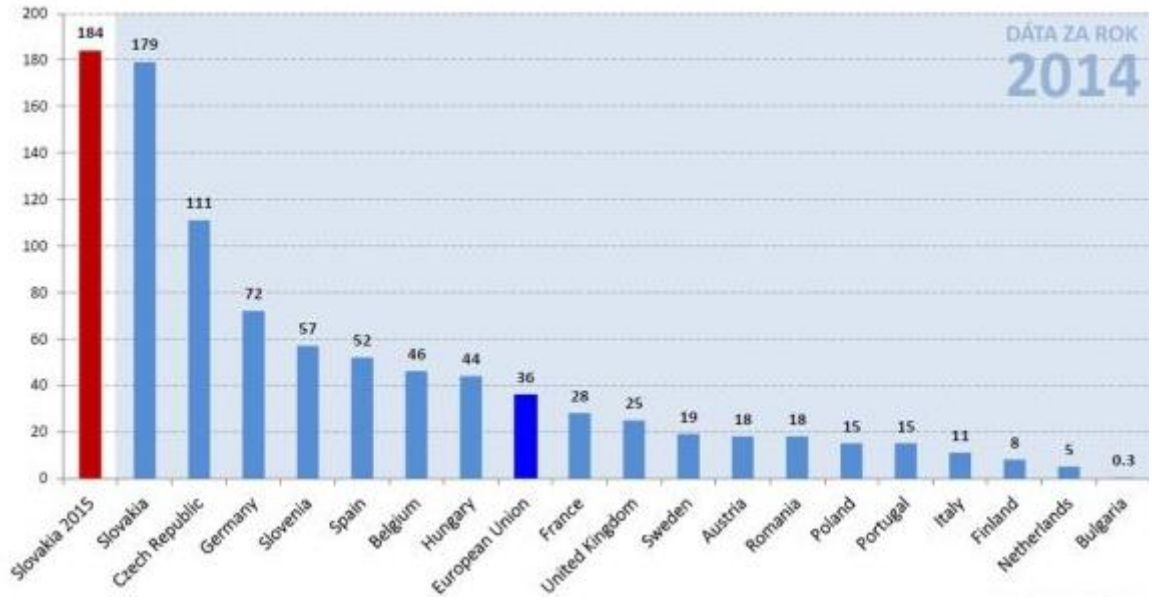

Figure 5 Ranking of the countries by the number of cars produced per capita (*Autobild Slovensko* 2016)

1.3 Impact of the automotive industry on the environment

The constantly growing volume of production in the automotive industry forces businesses to seriously address the environmental issues. The environment is affected not only by the actual production of cars but also their operation. The result is a negative impact on the environment by means of combustion gases, dust, noise, and water pollution.

However, the environment is not the only sphere to be negatively affected by the automotive industry. Industrial production of vehicles and their components consume various limited resources and therefore a question of re-usage of used cars is raised. The fact that cars and their parts are considered as hazardous waste also has to be taken into account. One of the main sources of environmental pollution is caused by motor vehicle traffic, which contributes up to 80 percent of the negative impact (*Friends of the Earth*, 1997). It mostly concerns the vehicles which are not equipped with catalytic converters and filters. The production of vehicles accounts for 10 percent of the damage, car disposal accounts for another 10 percent.

The automotive industry, including transport, which is closely related to the automotive industry, consumes a total of 20% of the total energy used, 83% of which accounts for transportation, which also produces 81% of carbon monoxide CO and 51% of nitrogen oxides. Moreover, the air is regularly polluted by unburned hydrocarbons, soot particles and

fine dust containing heavy metals. Another component of contamination is water, the pollution of which occurs when the waste water from auto repair shops and washrooms is discharged into the sewer system. Groundwater can also get contaminated by leakage of mineral oils, chemical detergents, and heavy metals. Based on the above-mentioned facts the environmental policy should adhere to three primary objectives:

- Reduction of emissions,
- Reduction of fuel consumption,
- Reduction of non-recyclable waste (Kováčová 2003: 38).

The established standards, which are also governed by legislative standards, are the primary driving force which compels automakers to constantly look for new, more modern, more fuel-efficient and environmentally less damaging solutions. This has a direct impact on the SM approach in the automotive sector. Creating new solutions that meet the established standards has become one of the key marketing tools in the field of SM. Monitoring and fulfilling the emission standards is a crucial issue, so the next part of this thesis deals with the ways in which the most significant market players of the automotive industry cope with the set limits and use them to their advantage.

The emergence of emissions is mainly related to the activity which results from the final product of the automotive industry. It is referred to as road transport. It is one of the largest current sources of air pollution. A suitable alternative is the replacement of the well-established petroleum fuels by alternative fuels such as compressed natural gas. This could help to achieve a lower level of air pollution by reducing the amount of discharged harmful air emissions. Natural gas is considered as a source of clean energy. It does not emit solid particles into the atmosphere when burning, reduces exhaust emissions and does not cause water and soil contamination in case of fuel system breakdown. However, this system requires higher initial investment costs, which is currently more alluring for buses and trucks, as in their case, the rate of return on investment is much higher than in the case of IAT (individual automobile transport). Besides this type of alternative fuel, the car manufacturers are currently looking for options to replace conventional fuels. One of them is LPG, which has been used worldwide for over 60 years. It is a drive by means of liquid petroleum gas, which is similar to other liquid masses placed in the tank (*AEGPL Europe*, 2010). Also, there have been several years of successful experimentation with biofuels such as methanol, ethanol, biodiesel or biogas. Electric vehicles are becoming increasingly popular. Their

major difference from other vehicles is the engine based on electricity, which is stored in the built-in battery. Solar cars are also connected with this type of engine. They are based on the same principle as electric cars, but the batteries are recharged via solar panels. There are also different combinations of engine types. Thus equipped vehicles are called hybrid cars. Vehicles of this type are currently mass-produced. The least explored area, nonetheless a very promising one, is dedicated to cars driven by means of hydrogen.

Another method that has already been in use and proven highly effective, is the use of a catalyst in cars. The latest catalysts can reduce emissions of nitrogen oxides, carbon monoxide, and hydrocarbons by more than 90 percent. However, this percentage is only accurate after the engine is heated, so the overall efficiency of the vehicle throughout its life ranges from 60-80% compared to the vehicle without a catalyst. Lowering the fuel consumption plays a very important role in reducing overall emissions. It occurs by means of the gradual improvement of the engines design and electronics applications, increasing the share of diesel engines, reducing the weight of cars and appropriate design modifications of car bodies (Kováčová 2003: 39). Nowadays, the development in this field continues by means of the above-mentioned gas-powered as well as hybrid engines, and engines based on fuel cells.

With the increasing production of vehicles, the topics of disposal of the end-of-life vehicles and the level of recycling associated with this process are becoming increasingly important. The main legal regulation is the European Parliament and Council Directive 2000/53/ES of 18 September 2000 concerning the end of life vehicles (*EURESP* 2000). This Directive establishes the measures aimed at preventing car-related waste production, as well as reusing, recycling and other forms of re-evaluating the end-of-life vehicles (ELV) and their components in order to reduce the amount of waste disposal and to improve environmental protection by involving all economic operators, especially plant operators processing ELVs. The Member States must ensure that materials and components of vehicles that were brought to the market after 1.7.2003 do not contain lead, mercury, cadmium and hexavalent chromium. The Directive also determines the minimum limits of reuse and replacement of components. Until 01.01.2006 this limit amounted to 85%, and after 01.01.2015 to 95%. Starting from 01.01.2016, according to Slovak legislation, the deletion of the non-existent old vehicle from the vehicle register is controlled by the new Act 79/2015 Coll. on waste and on the amendment of certain laws. The subject of old vehicles is governed by paragraphs 49-54, which are harmonized with the European Parliament and Council Directive

2000/53/ES of 18 September 2000 concerning the end of life vehicles. Since 2014, however, it is possible to delete an already non-existing vehicle from the records. This amendment caused a reduction in the number of recycled vehicles. Whereas in 2013 the plan of the Directive was successfully achieved and 95% of cars were recycled, only 82% of produced cars were recycled in 2014 (*Slovenská agentúra životného prostredia* 2015).

2 METHODOLOGY

The methodology of this thesis corresponds to its general purpose, which is to indicate the importance of the tasks faced by the entire automotive industry while fulfilling the set limits on emissions in the context of the SM policy of individual car manufacturers. The methodology is designed to come to a certain result, the content of which will be to evaluate the steps in the production and subsequent sale of cars with components which abide by the emission standards, especially for vehicles with innovative components which reduce the emission levels.

The main methods which were used in the empirical part of this thesis are:

- Analysis,
- Collection,
- Selection,
- Induction and deduction.

The method of analysis will be the first method used in the next part of the thesis. It will contain a detailed analysis of the legislature on emissions in the automotive industry. In addition, the main vehicle manufacturers connected to this system will be mentioned. Within the next step, the thesis will focus on the collection method, in which all available information on each of the major manufacturers will be collected in terms of:

- Statistics - production, sales, market share etc.,
- Environmental policy with the focus on emissions reductions,
- Marketing and sales policy of the manufacturer.

Besides this mainly statistical collection, the information from a different perspective will be used, by asking a potential customer to provide us with very important data, which will be used for comparison with the data collected from individual car manufacturers. Conducted in such way, the comparison will allow us to carry out firm conclusions on whether car manufacturers actually follow the needs of their customers or not. In addition, the comparison together with the planned induction and subsequent deduction will help us draw more accurate conclusions at the end of this thesis.

Next, following a broader collection of useful information, the method of selection will be used, to collect critical information needed to implement the methods of induction and deduction. Via induction we will describe obvious facts which result from the collected data. Based on the facts collected in such a way and with the help of deduction, the conclusion of the thesis will be prepared. It will include the final evaluation and a set of recommendations for sales strategies on how to benefit from implementing the methods of reducing emissions produced by the automotive industry and road transport.

3 ANALYSIS OF THE INDUSTRY

3.1 Emissions in the automotive industry - characteristics and legal framework

3.1.1 Characteristic of the issues from the perspective of the investigated sector

With regard to the topic of emissions in the automotive industry, it might be helpful to define what exactly the field of greenhouse gas emissions means. The earth's atmosphere consists of a mixture of gases, the largest share of which is made up of nitrogen and oxygen. Other gases have the ability to transmit short-wave radiation, which is heading to Earth from the Sun, but they absorb the longwave radiation inbound from the opposite direction and send a certain part of it back to Earth. These gases are called greenhouse gases. Except for their negative function, these gases are vital for the Earth to maintain temperatures above 0° C (Moldan 2003: 19).

Greenhouse gases are chemical compounds which are normally discharged to the atmosphere to form the thermal insulation layer, which can be compared to an ordinary glass greenhouse. These gases are generated by natural processes and human activities. Their disadvantages are the long decomposition period, which takes tens to hundreds of years, and their excessive concentration in the atmosphere, which is dangerous and needs to be eliminated (Lallanila 2016). The most important natural greenhouse gas is carbon dioxide, known as CO2. It causes up to 72% of the greenhouse effect (Rohrer 2007). One of the most frequent reasons for its formation is mainly decomposition of dead plants in soil or spontaneous combustion of fossil fuels and wood forests. Human activity causes several times bigger impact on the production of greenhouse gases, especially the burning of fossil fuels for energy, industry, and transport. While the levels of carbon dioxide have fluctuated cyclically from 180 ppm to 280 ppm over the past 600,000 years, in 2009 the value exceeded 386 ppm. Today this value fluctuates in the range of 400 ppm (Lallanila 2016).

It has already been mentioned previously that the automotive industry also contributes to the emissions. It occurs on three main levels. The first is the level of production itself, where the environmental impact is not so principal. The second and more significant level is the result of the production process, which has a relatively high degree of impact on the emission levels

in the atmosphere. That is why the emission norms which are set for cars (including their production) are becoming increasingly stringent and car manufacturers must gradually adapt to these rules. There are two perspectives on this issue, one that reflects the needs of environmental protection and the second, which the car manufacturers consider a bit unfair in terms of global statistics. It is certainly desirable and necessary to prevent every single sector from negatively impacting the environment. On the other hand, it is also necessary to establish fair conditions, which will not be destructive for businesses. Automobile manufacturers state that the current limits on vehicle emission are set strictly, despite the fact that transport is not the biggest polluter. The statistics clearly show that the largest emitter of greenhouse gases is the energy sector, which is responsible for 21.3% of emissions. It is followed by industrial manufacturing including the automotive industry with 16.8%. However, the transport alone contributes only around 14% to the production of greenhouse gases, even with all types of transport included. Road transport contributes only 10.6% to the total production of greenhouse gases (*Environmental Protection Agency* 2016).

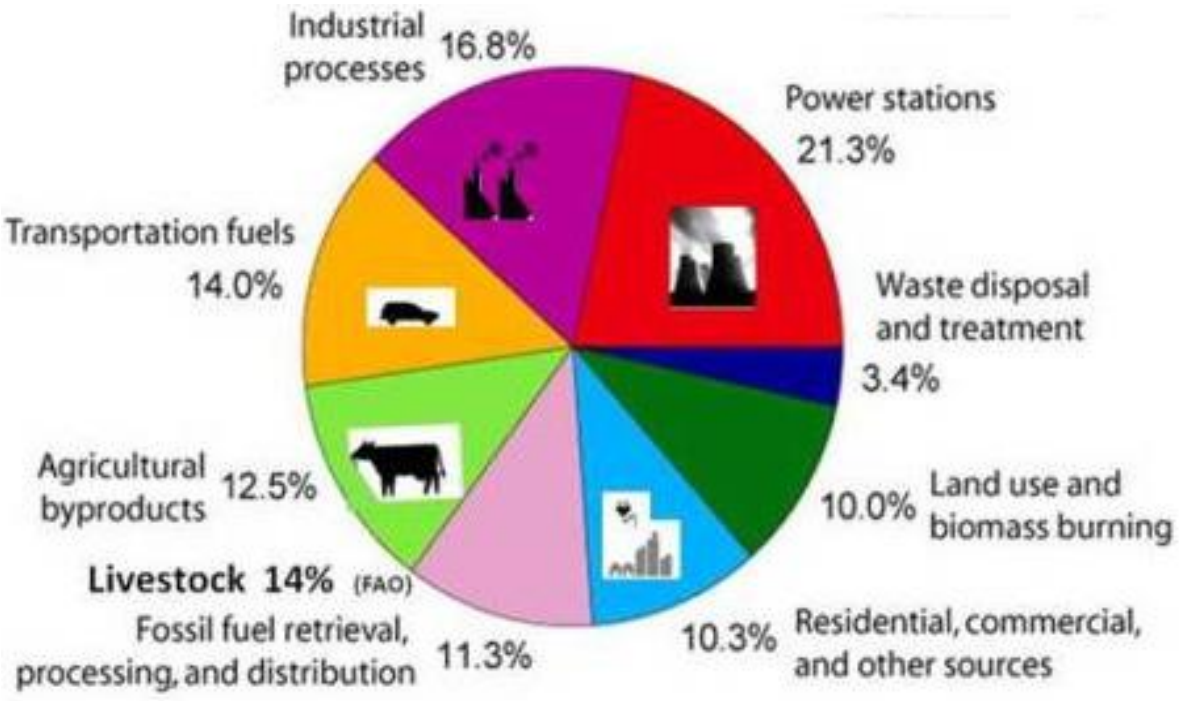

Figure 6 Share of individual sectors in the creation of greenhouse gases on a global scale (*Environmental Protection Agency* 2016)

The last, but nonetheless a very serious issue, is the consumption of energy, which is clearly linked to the transport sector. Automobile transport contributes significantly to global energy consumption through consumption of liquid fuels, which are produced from crude oil. As mentioned above, the energy industry is statistically the biggest emitter of greenhouse gases,

which are discharged into the atmosphere during the production of energy. This is the reason why manufacturers are constantly looking for new opportunities for alternative fuels to replace the commonly used conventional fuel-based hydrocarbon fuels. These types of alternative drives are significantly more environmentally friendly and efficient also in terms of operating costs. However, this rule does not apply to all types of alternative drive vehicles.

The last the topic to address in this part of the thesis is the categorization of transport emissions. Emissions which are generated directly during automobile and fuel production will not be given special attention here, as the primary focus of this thesis is the SM in relation to the new standards of emissions, which emphasises the importance of the vehicle production and operation.

When addressing emissions which arise during the operation of cars, not only the gaseous emissions are meant, which are formed by the exhaust gases and fuel vapours produced during fuel transfer. Transportation causes emission of particulates that occur in the form of soot and other solid particulates. Another unpleasant type of emission, also associated with transport, is the noise emission. It is caused by the engine operation, as well as by the aerodynamic noise of the body of the vehicle and the noise produced by rolling tires. The impact of noise on the population is currently being eliminated directly during the road construction by means of the noise barriers. In the cities, unfortunately, the negative impact of the emissions cannot be eliminated completely, it can only be reduced. Electric cars generate the emission of electromagnetic radiation.

The components of the emissions of internal combustion engines are as follows: Carbon monoxide (CO), particulate matter (PM), nitrogen oxides (NOx), unburnt hydrocarbons (CHx), carbon dioxide (CO2), sulfur dioxide (SO2), volatile organic compounds, ozone (O3) (Škoda Auto 2015: 14).

3.2 Legislative norms of managing the emission standards of the automotive industry and road transport

The development of legislation on limiting emissions generated by transport means, in comparison with the development of vehicles, has surely been time-delayed. The first evidence of the impact of vehicles on air pollution was presented in the 50s. The emissions of noise and smoke were mentioned first.

The first emission norm, which dealt with the number of exhaust fumes, was established in California in 1968. The first European standard to address the matter in question was established three years later in 1971. Its name was UN ECE 15. It was issued by the Economic Commission for Europe as the UN sub-commission. It determined the levels of carbon monoxide (CO) and hydrocarbons (HC) on the basis of the technical level of combustion engines at that time. The estimation of the limits on the amount of exhaust from gas emissions is managed by the Euro emission standard in the European Union. Euro is a binding norm that limits the amount of carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO) and the amount of particulate matter (PM). The values are given in milligrams per each travelled kilometre. The current standard does not address other substances contained in exhaust gases. The above-mentioned standard has its history. Euro 1 standard, which was established as far as 1992, was the very first standard. Standards EURO 2-4 followed. Currently, two basic emission standards, Euro 5 and 6, apply in the EU (Sajdl 2016). Each subsequent standard set the increasingly stringent parameters for individual vehicles to fulfil during a given amount of time. Euro 5 emissions standard for cars and small trucks has been in effect since 2009. It applies to all vehicles of categories M1, N1 and N2 (category M: motor vehicles having at least four wheels and used for the carriage of passengers, category N: motor vehicles having at least four wheels and used for transporting cargo) with a total gross weight of 2610 kg (*European Commission* 2016b). This emission standard is applicable to all vehicles which were type-approved from 1 September 2009 to 1 September 2014, and to all vehicles which were put on sale from 1 January 2011 until 1 September 2015. Euro 6 is, in turn, applies to vehicles type-approved from 1 September 2014 and on sale from September 1, 2015. The overview of individual limits of emission standards for different categories of vehicles can be seen in the following tables.

Table 3 – Overview of the limits of each EURO emission standard for cars category M1, N1 and N2 (Made by author according to the source Sajdl 2016)

Year/norm		CO [g/km]		Nox [g/km]		HC + Nox [g/km]		HC [g/km]	SP [g/km]
		Petrol	Diesel	Petrol	Diesel	Petrol		Petrol	Diesel
1992	1	3,16	3,16	x	x	1992	1	3,16	3,16
1996	2	2,20	1,00	x	x	1996	2	2,20	1,00
2000	3	2,30	0,64	0,15	0,50	2000	3	2,30	0,64
2005	4	1,00	0,50	0,08	0,25	2005	4	1,00	0,50
2009	5	1,00	0,50	0,06	0,18	2009	5	1,00	0,50
2014	6	1,00	0,50	0,06	0,08	2014	6	1,00	0,50

* 0,90 for engines with direct injection
** 0,10 for engines with direct injection

Table 4 – Overview of the limits of each EURO emission standard for commercial vehicles (Made by author according to the source Moravčík 2013)

Year/norm		CO [g/km]	HC [g/km]	Nox [g/km]	SP [g/km]	smoke emission
1992, <85 kW		4,50	1,10	8	0,61	x
1992, >85 kW	I	4,50	1,10	8	0,36	x
10/1996	II	4,00	1,10	7	0,25	x
10/2000	III	2,10	0,66	5,00	0,1	0,80
10/2005	IV	1,50	0,46	3,50	0,02	0,50
10/2008	V	1,50	0,46	2,00	0,02	0,50
	EEV	1,50	0,25	2,00	0,02	0,15
1/2013	VI	1,50	0,13	0,40	0,01	X

3.3 Sampling methodology for evaluation

3.3.1 Justification of the content of collected data

The enforcement of strictly set limits applicable to internal combustion engines causes the big-scale funding of research, development, and innovation in this field. The funding is, however, not very effective as the limits set above the level of Euro 5 standards are too strict. Setting those limits creates certain illogical context, when the lowering of the boundaries of a particular substance causes the increase of the level of another substance, creating a subsequent counterproductive effect. Overall, it seems that today the set limits are forcing consumers to continuously buy new cars. Therefore, a small number of protests occur during the development of emission standards.

Stringent emission limits have more than one purpose, which is the environmental protection. The secondary purpose of setting them is to make the vehicle producers ready to offer alternative power sources. This need arises from the fact that the world is slowly approaching a dangerous point, beyond which only a limited amount of raw materials will be available, which means a threat to global energy security. The growth in car production requires a simultaneous increase in the consumption of many materials, especially metals. The population growth rate certainly means a growth of demand for cars and, therefore, materials used for their production. In addition to increased emission from production and transport, there are other threats to the environment such as limited access to raw materials, land take, water pollution and excessive waste.

The danger is real and the car manufacturers, who are also pressured by their customers, have to look for alternative solutions immediately. Setting stringent emission allowances cannot be regarded only as a "whip for car manufacturers", but as an incentive to protect the environment in several spheres. On the other hand, it can be regarded as a convenient marketing tool, used for the benefit of SM of the production organization. In the following lines, the four largest world car producers are looked closely with the aim of evaluating their response in the sphere of marketing and sales strategies in relation to the established emission rules.

3.3.2 Sampling

During sample selection, the car manufacturers with the largest number of vehicles sold in the last assessed period are chosen. The evaluation criterion was the number of vehicles sold and the period was the year 2015.

The figure shows the four major global automakers in the last two years. The group and the order of its members have not changed in these last two years. However, it is interesting, that in 2015 Volkswagen AG was leading the chart for a long time, but the outbreak of the emission scandal in the second half of the year finally moved it to the second place. Next in order are the other major automobile corporations which implement the strategies applicable to this thesis. Therefore, particular subsections will be dedicated to the selected sample of the three major car manufacturers, and evaluate their response to marketing and sales strategies concerning the established emission rules. Also, the questionnaire survey will be dealt with, which was given to the sample of potential customers of automobile

manufacturers. In this way, a comprehensive view of the entire automotive industry will be obtained, whereas induction and deduction alone, gained from the data of the biggest automobile producers, would not provide full accuracy for this thesis.

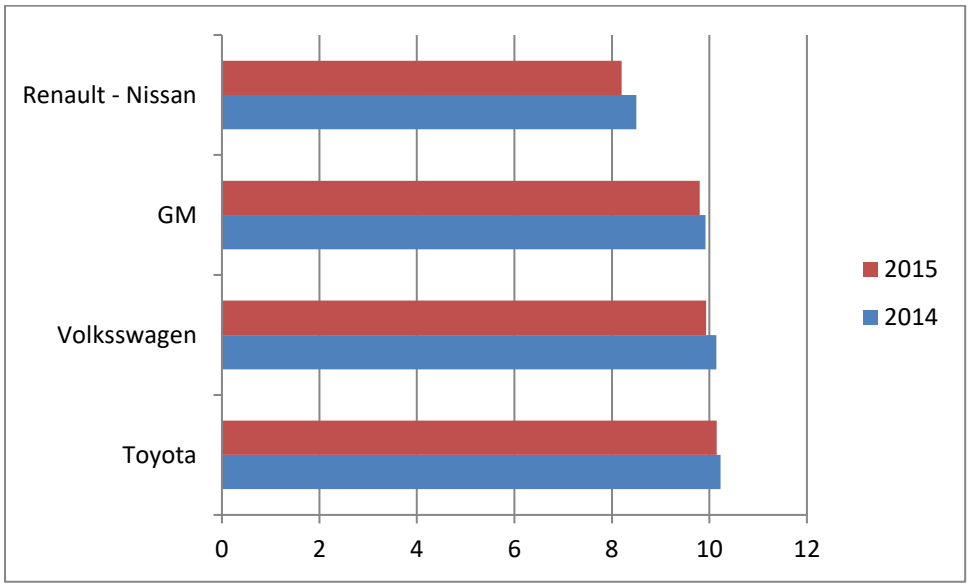

Figure 7 Sales of the world's four largest automobile manufacturers in 2014 and (*Statista* 2016a)

3.4 Toyota Motor Co. Ltd.

3.4.1 Company Overview

Toyota Motor Co. Ltd. was established in 1937 and gradually grew into one of the largest and most important world producers. The company does not focus exclusively on the production of vehicles - its portfolio is much broader. The company was founded in the late 19th century when its business was in textile weaving. The company was founded by Sakichi Toyoda, who was nicknamed “King of inventions”. He managed to introduce mass production by using an automated weaving loom. His son Kiichiro successfully followed in his father's footsteps and managed to establish an automotive department within the textile company. Plans to establish a production of passenger cars were disrupted by the approaching World War II, which caused the demand for the construction of trucks. Thus, the first truck “Model G1” was completed. After launching mass production of these vehicles, Kiičiro returned to his objective, which was the production of passenger cars. The first passenger car Model AA was constructed in 1936. Starting from 1937 it was produced under the name of Toyota Motor Company, today Toyota Motor Corporation. Over the long years of its existence the company overcame a number of crises and obstacles. It has also

achieved success and grown to its current size. Today this company employs more than 340 000 workers and sells its products to more than 160 countries. Its products and components are developed by fifteen design, research and development centres and subsequently produced in 69 manufacturing plants located around the world. The head of the company is president Akio Toyoda, a grandson of Kiichira Toyoda. He manages five regional headquarters (*Toyota* 2016a).

Toyota Motor Corporation is the world leader in the production of cars. Its two main competitors are Volkswagen and General Motors. In its fiscal year of 2015/2016, Toyota reported a record net profit of 18.61 billion euros, thereby exceeding the profit of the previous year. Profit growth was driven by the reduction of costs and exchange rate fluctuations. The corporation, however, predicts a profit drop by 35% in the next fiscal year of 2016/2017. The company is exceptional in many areas. Firstly, it can produce more than a double margin compared to the median of the whole industry. Toyota's current margin stands at 10.1%. It is linked to the policy of the company, which has been to enforce the implementation of its produce into the local markets, also related to the reduction of currency risk as well as the overall reduction in transport costs. The company is now the most successful at selling its vehicles in the markets of North America and Japan, as seen from the regional overview of revenues and sale of cars presented in the following figures (Šperka 2016).

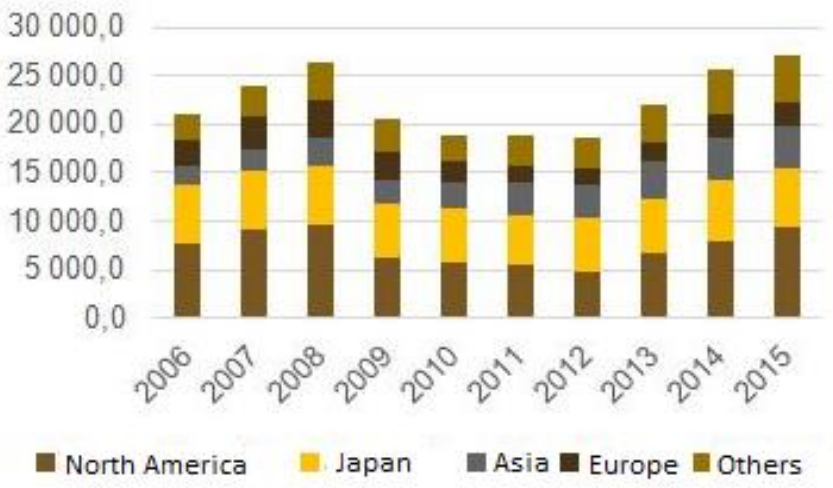

Figure 8 The regional distribution of Toyota Motors Corporation revenues in billions of yen (Šperka 2016)

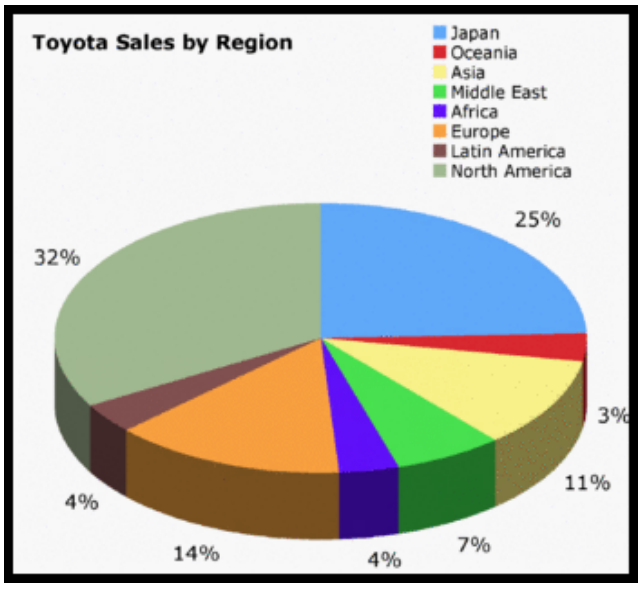

Figure 9 The regional distribution of Toyota sales (Made by author according to the source *Slideshare* 2016)

It is obvious from the development of company revenues that Toyota was influenced by the global financial crisis of 2009 when the company's revenues were falling until 2012. However, since 2013, they have been continuously rising. At present, they are already at a higher level than they were in the pre-crisis period. This means that the stringent emission standards had no impact on the company management and the corporation successfully coped with the requirements.

3.4.2 Environmental policy of Toyota Motor Corporation

Toyota presents itself as a company with a maximum emphasis on protecting the environment. It cannot be denied that the corporation has made a number of positive steps towards the improvement of its condition and getting recognised as “eco-friendly”.

In its philosophy, Toyota applies the so-called Lean Management, developed by the company itself in the 50s, which is the reason of its perfect application by the company. The definition of Lean Management says “Lean is a systematic approach that focuses the entire company on continuous improvement of quality, cost, delivery, and safety by eliminating waste, creating flow and increases the speed of the system's ability to respond to customer demands” (Plenert 2007:12). Virtually, it is the methodology of Lean Manufacturing, which has the motto “Our Customer is King.” Only what the customer wants is produced. In this

case, the equation Price = Cost + Profit is altered to Profit = Price - Cost. It is due to such approach that Toyota achieves much higher margins than other car manufacturers.

It is important, however, that due to this approach Lean directly impacts the environment. The definition states that this approach eliminates waste and has the quickest response to customer requirements. Lean Management is not simply a system “on paper”. Toyota built the first waste-free factory and also was the first company to start producing specialized trucks used in the recycling sector. In addition, the company had sensed the changing mindset of the customers at the right time and again was the first to respond to their requirements, introducing a hybrid vehicle with hydrogen fuel cells, which produce zero emissions, to the market. In addition to the company's achievements in the field of environmental policy, Toyota has already set further objectives which constitute “Toyota Environmental Challenge 2050”. The objectives that Toyota has set by 2050 concern fulfilling the environmental areas that go beyond zero impact on the environment. This means that by 2050 Toyota intends to improve the environment. The objectives take into account the company's intent to use new technologies and the new mindsets which cause the increase in recycling, natural resources conservation, usage of renewable energy and help people worldwide to live and work in harmony with nature. The company has already partially fulfilled these objectives through the production of hybrid and electric vehicles. In addition, it initiated research into renewable energies that would be useful not only in the operation of vehicles but also in their production. In cooperation with its partners, Toyota is trying to design cleaner and more efficient integrated transport systems. All these activities should contribute to the sustainable mobility of the future. The company is guided by “four Rs - Reduce, Reuse, Recycle and Recover”, which in practice means careful use of natural resources, more efficient recycling and saving energy during production. In their factories around the world, Toyota is “increasing the use of low-carbon, renewable power sources, as well as creating new low-carbon materials from organic products” (*Toyota* 2016b).

In 1992, in direct response to the international initiatives at the Summit “Earth” in Rio, the company established the Toyota Guiding Principles. The negotiations at the summit resulted in a declaration of principles in forestry, conservation, and sustainable development. The main principles of Toyota are a cornerstone of the corporate management philosophy and provide Toyota with a clear vision of how to achieve sustainable development. The principles form the basis of the Toyota Earth Charter (adopted in 1992 and updated in 1997 and 2009), which indicates the basic policy of Toyota and measures leading to effective

environmental management and improvements. With regard to the main principles of the Toyota and the Toyota Earth Charter, the European environmental policy has been developed as a means of linking principles, objectives and action plans with management structures and systems (*Toyota* 2016b).

European environmental policy

In order to ensure effective management of the consolidated environmental system, in January 2003 Toyota changed the structure of the Commission for the Environment in order to cover all European operations. The Commission for the Environment, whose members are the executive directors of all business activities, approves and monitors the performance of a Europe-wide 5-year environmental action plan (*Toyota* 2016b).

In Europe, Toyota has introduced a comprehensive and consolidated environmental management structure in accordance with ISO14001. The aim is to continually reduce the carbon footprint by regulating GHG emissions resulting from the entire operations of Toyota. The use of the system of chemical control improves the protection of the environment and helps to improve air quality, while the full implementation of recycling management helps to reduce the need for primary resources.

In addition to reducing emissions throughout the life cycle of the product, CO2 emissions are also reduced during its use, through the utilization of the current technology of vehicles such as Toyota Optimal Drive and Hybrid Synergy Drive. In the future, the reduction of emissions will be achieved with the help of new technologies like Plug-in hybrid electric vehicles and hybrid vehicles with fuel cells. Toyota is actively developing these new technologies and applies them to new mobility solutions (*Toyota*, 2016).

3.4.3 SM of Toyota Motor Corporation during the tightening of emission rules

The company in line with its environmental policy strongly supports all efforts to mitigate the environmental impact of car traffic. The sales strategy of the company states that if manufacturers want to attract customer interest in environmentally friendly vehicles, they must offer them a sufficiently large and interesting group of vehicles which, on the one hand, would meet customer requirements and, on the other hand, could make the customers appreciate their own contribution to the environmental improvement. Toyota, through a massive but unobtrusive campaign, managed to get into the minds of their loyal customers

who, in their turn, have shown great interest in the vehicles in question in recent years. The sales strategies of the company anticipate the fact that emission allowances will continue to tighten in the future until they reach a stage of obligatory zero emission generation. While other companies work on reducing the emissions to the current standard, Toyota realised that the future belongs to the new technologies and their production must be adapted to this fact as soon as possible.

In May 2016 Toyota Motor Corporation announced that by the end of April 2016 it had already sold more than 9,000,000 hybrid cars. For its customers, Toyota has already prepared 33 models of cars which offer this kind of drive. In 2015, the company started selling the hybrid model of the popular MPV labelled Sienta and the fourth-generation Prius. Furthermore, Toyota introduced two more hybrids - Corolla and Levin, intended for the market of China. The new hybrid Toyota RAV4 is currently available also in Slovakia. In line with the strategic document Toyota Environmental Challenge 2050, the company has set a goal to sell a total of 15 million vehicles with a hybrid engine by 2020. This means that in addition to the already sold units, another 6 million cars will be produced for sale in the following 4 years. According to the company calculations, hybrid Toyota vehicles, compared to conventional vehicles of the same parameters, ensured saving 67 million tons of CO2 emissions. Moreover, they helped to save about 25 billion litres of gasoline, which also contributes to saving millions of tons of emission produced during the fuel production. Toyota introduced its first hybrid vehicle in 1997, in the same year as the Prius vehicle. Since then, all hybrid vehicles have gained great popularity among their customers and have been sold in more than 90 countries worldwide. The best-selling model is the Prius, which sold more than 3.7 million units. The priorities and strategies of Toyota will remain unchanged also in the future, with the plan to continue promotion of hybrid vehicles, including all related technologies that contribute to environmental conservation (*Transservis* 2016).

That is how Toyota sells four times more hybrid vehicles than any other automobile manufacturer worldwide. Toyota's hybrid vehicles offer an exceptional level of fuel consumption and emissions without sacrificing the space intended for passengers and luggage. Due to Toyota's sales strategies, the clients perceive these vehicles as ordinary cars, which encourages further development of these and other advanced technologies in the field of automotive transportation. The performance data of the new generation of hybrid vehicles represent significant technological advances in batteries, electric motors, and petrol engines which aim at the electrification of cars by means of hybrid drives, rechargeable electric

drives, and fuel cells. The new generation Prius vehicles are equipped with new batteries with higher energy density. During research on batteries and following its results the company focused on the expansion of production capacity of NiMH and Li-Ion batteries in order to further implement them in the electrification of vehicles. While producing these vehicles the manufacturer packed them with various surprises such as engine efficiency increased by 1.5 percent and the use of global architecture TNGA with a lower centre of gravity and improved aerodynamics. Toyota is also developing a new system of wireless/inductive charging, which uses resonance between the coils in the floor and deck to transfer power to the battery. Owing to its strategy, Toyota can declare itself a leading company in the industry with the lowest level of emissions of the global car fleet, which is only 100 g/km. In Germany, the vehicles of this type produce 95 g/km.

Last year Toyota ended a three-year project cycle, which featured 23 new or upgraded hybrid models. In the next cycle, which is currently underway, Toyota plans to introduce more than 15 models, some of which have already been presented. Toyota expects every increase of performance and functionality of hybrid vehicles, along with smaller system dimensions and lower costs, to lead to an increase in their popularity, smooth sales and marketing in the future.

3.5 Volkswagen AG

3.5.1 Company Overview

German automaker Volkswagen is established, as a member of the Volkswagen Group, in Wolfsburg. For long, it has been one of the most powerful car companies in the market. Its history begins with the founding of the company in 1937, based on the idea to produce cars for the masses, for everyone to afford. The design was developed in 1934 when Ferdinand Porsche was commissioned to draft such a car. Due to issues with financing, however, the foundation of the company moved to the above-mentioned 1937. The first name of the company was “Corporation to prepare the way for the German People’s Car”. A year later it was renamed Volkswagenwerk GmbH. During World War II, the company switched to military production, also taking over repairs of Junkers Ju 88 aircrafts and started producing military cars. After the war, the production of passenger cars was restored. In the first three post-war years, the company produced 1000 new vehicles. In the 50s of the last century due to the production of the famous VW T1, their sales spread to almost all continents of the

world. Throughout the history, Volkswagen AG has been through a lot of changes, which mostly strengthened the automaker, and today, despite the recent emission scandal discussed further in the thesis, it can proudly bear the title of one of the best-selling brands (Grieger, Gutzmann 2014: 342).

The company is now the largest European car manufacturer, with its 119 production plants within 20 European countries and 11 countries in America, Asia, and Africa. It operates in more than 160 countries. The corporation has hundreds of thousands of employees. The whole corporation consists of 12 brands from seven European countries: Volkswagen passenger cars, utility vehicles Volkswagen, Audi, SEAT, ŠKODA, Bentley, Bugatti, Lamborghini, Porsche, Ducati, Scania, and MAN. In 2015, the company sold almost 10 million cars and its revenues rose by 5.4% to € 218.8 billion. Vehicle sales in Europe increased by 2.1% to 4.5 million cars in 2015. Revenues also grew by 7.9% to € 132.5 million. In North America, sales grew by 7.0% and revenues rose by 28.1%. The opposite trend occurred in South America, where there was a decline in sales by 32% and revenues by 26.8%. In Asia, on the contrary, there was a small decline in car sales by 2.5%, but revenues rose by 7.6%. Despite this growth, however, with regard to emissions scandal and resulting costs of legal services, technical adjustments and buyouts, in 2015 the company reported a loss of 16.9 billion euros. Without those special clauses, the company would be able to reach the profits of 12,8 billion euros in 2015 (*Volkswagen AG* 2016).

The company is, therefore, the most successful in domestic European markets and in Asia, mainly due to high demand in China. The most successful brand of the corporation is the unrivalled Volkswagen. The facts can be checked in the following figures.

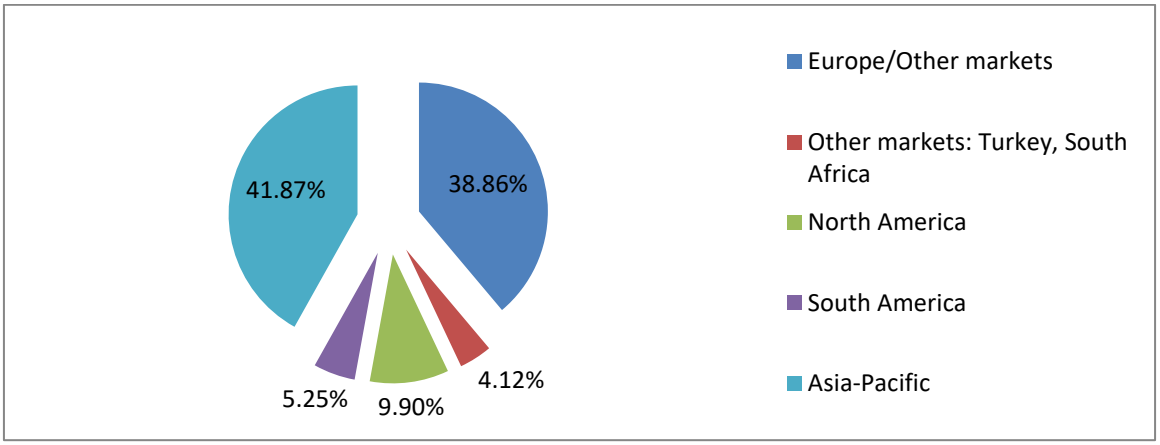

Figure 10 Volkswagen: regional shares for passenger car sales (*Volkswagen AG* 2016)

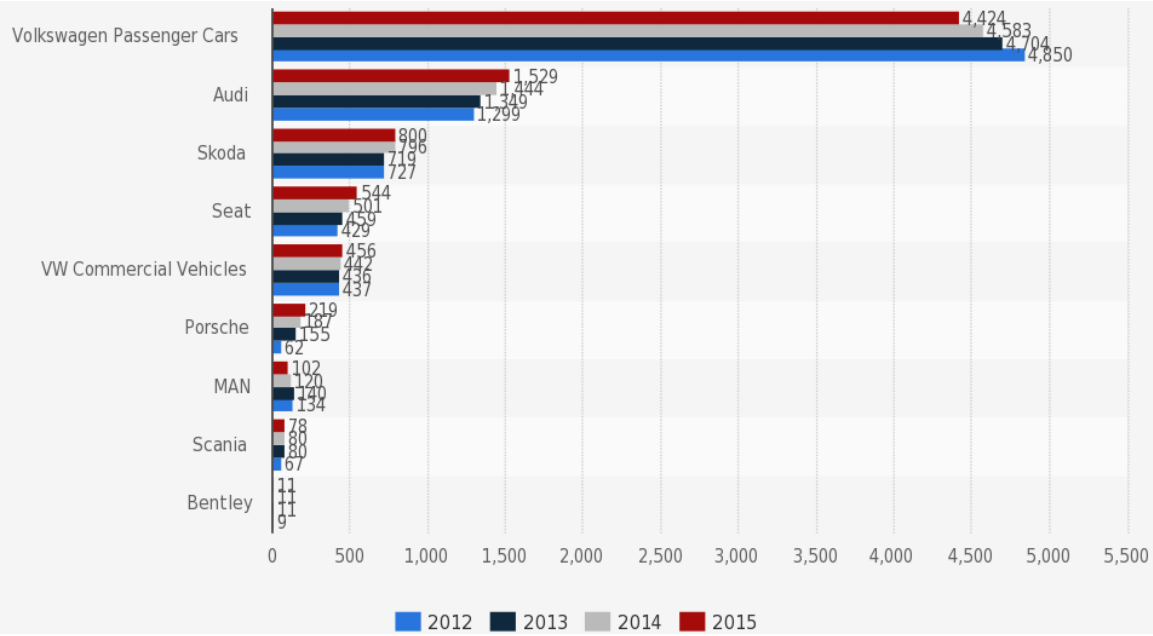

Figure 11 Developments in sales of various brands of the Volkswagen Group in the years 2012-2015 in thousands (*Statista* 2016b)

3.5.2 Environmental Policy of Volkswagen AG

The Volkswagen Group laid the foundations for sustainable development in 2005 through its environmentally-friendly BlueMotion vehicles that focus on efficiency. Their main feature should be efficiency based on reduced consumption including the reduction of CO2 emissions. Those models are equipped with BlueMotion Technology, which reduced the consumption by 0.5 litres in comparison to other models (*Volkswagen Slovakia* 2013: 38).

Subsequently, in 2010, Volkswagen launched its new environmental program Think Blue. This program is aimed at the responsible approach to the environment. The corporation adopted the strategy to "realize the vision of green mobility, resource efficiency, and sustainable development". This system does not only include the production of environmentally efficient cars but also ecologically oriented production based on efficient production lines. The strategy aims at reducing the impact on the environment between 2010 to 2018 by 25% by means of each produced vehicle, as well as everything included in the process of vehicle production. The strategy establishes the objectives in five major areas:

a) *"Power consumption - for all uses of electricity, gas and process heat to use existing potential savings and efficient technologies, regardless of whether the energy is produced by Volkswagen itself or is purchased from external suppliers.*

b) *Waste Generation - passing residues from the manufacture, packaging and unusable parts of maintenance for further evaluation. During waste disposal management to work on reducing its quantity.*
c) *Volatile organic compound emissions - reducing emissions of volatile organic compounds in all areas.*
d) *Water consumption - increasing the volume of recycled water and reducing the use of potable water.*
e) *CO2 emissions - reduction of CO2 emissions at the stage of its production, using the energy of the favourable climatic conditions from the regenerative sources such as the wind, water, and the sun"* (*Volkswagen Slovakia* 2016).

Certain aspects of the objectives have already been successfully achieved by Volkswagen. For example, in the sphere of waste production, the company has managed to fulfil the goal concerning the amount of the planned waste reduction per each produced car. That added up to 30.8% compared to 2015. The goal to reduce emissions from volatile substances has also been fulfilled, compared to 2010, and now the company eliminates up to 32.5% of thus generated emissions. The corporation is also close to achieving the reduction of CO2 emissions goal, as it lacks only 6% of the 25% target. However, the company is a bit further from achieving its objective in energy and water consumption, which are only fulfilled by 16.3% and 8,9% respectively.

3.5.3 SM of Volkswagen during the tightening of emission rules

In the past, the automotive corporation exhibited its environmental policy through ThinkBlue, which is related to the field of reducing emissions. However, in September 2015, the enforcement of this policy revealed serious flaws, when the public learned that the emission values of the exhaust fumes of Volkswagen cars equipped with diesel engines are "counterfeit". This triggered a large scandal, which received the name "dieselgate". Despite the fact that the resigning Chairman of the Board Martin Winterkorn claimed that he had not been aware of the fraud, the company's internal documents prove otherwise. According to them, the company's management knew about the fake values but failed to act upon it. Moreover, in 2014, Volkswagen received a warning from the US Environmental Protection EPA, yet to no avail.

Essentially, “dieselgate” is the fact, that the Volkswagen car manufacturer had equipped its vehicles with diesel TDI engine software, which reduced the amount of nitrogen oxide emissions during inspections so that during the tests the cars could meet the limit set by law. Carbon dioxide emissions data, which is a crucial criterion for the calculation of taxes on motor vehicles, was also miscalculated. A solution of the case is different for the American and the European markets. While in the USA the number of cars which violate the permitted level of emissions is in total 482,000, in Europe there are more than 8.5 million of such vehicles. Due to mush stricter emission standards in the USA, it was decided to adjust the vehicles as a solution, which is practically impossible. That is why Volkswagen has agreed with the USA authorities on the gradual reimbursement of consumers and states. This means that Volkswagen has offered to buy out the cars at no extra cost for the customers. The prices of these vehicles ranged from 12,500 to 44,000 US dollars. In addition, the company must invest $2.7 billion to support the so-called “Green projects” and within the next 10 years another $2 billion to improve the infrastructure and promotion of zero-emission vehicles. In Europe, the solution to this situation is quite different. Given the high number of affected cars, Volkswagen cannot reimburse all their customers as in the case of the US market. The costs of this kind of compensation would be circa 200 billion euros, which is the price the company cannot bear to pay without going bankrupt, which would ultimately affect all taxpayers. The company management realised that the vehicle adjustment would be a considerably easier solution in Europe, considering the less strict emission standards than in the USA. Nevertheless, a number of consumers and consumer organizations are planning to submit a lawsuit against the company for double standards in customer compensation. In addition, the automaker is being sued for € 3.3 billion by over three hundred investors for damage caused by falling shares (Teknos 2016).

Volkswagen spent an overall amount of 16.4 billion euros to deal with this case. The emission scandal caused multiple falls of company shares, as illustrated in Figure 12. There is an obvious rapid decline is stocks following the scandal, as stock prices fell to the level of 106.50 euros per share, while at the beginning of 2015 the shares reached the values close to 250 euros per share. Currently, the value of the shares stands at around 130 euros per share.

Figure 12 Evolution of the prices of Volkswagen shares in April 2015 - February 2016 (Pečený 2016)

Clearly, the fraud scandal has shaken the entire automotive industry. Resolving it is the matter of survival for Volkswagen. The automaker, through the fault of their own, experienced damage and loss of trust, which will be very difficult to recover. In general, "dieselgate" was not strongly reflected in overall car sales. Surprisingly, car sales of Volkswagen were not weakened. The emission scandal affected Volkswagen only at the end of the previous year. Volkswagen has been competing for long with Toyota in the number of sold cars and while it literally dominated the first year, by the end of the year, due to the scandal, it lost the leading position to Toyota. After the first three months of 2016, however, the situation changed and Volkswagen's global sales increased by 0.8%. Within that time Volkswagen had already sold 2.49 million cars, which is 300,000 cars more than Toyota. A comparison of two other strong players indicates, that the emission scandal affected the car sales only in the fourth quarter of 2015 and made Volkswagen lag considerably behind its competitors. By contrast, the situation in the first quarter of 2016 was quite the opposite, however, it was the result of Toyota's steel supply disruption the earthquake on the island of Kyushu, which shut down part of the company's production capacity. Volkswagen grew mainly in China, where it reached the growth of 6.4%. 3.5% growth was recorded in Europe. Conversely, it was still experiencing a decline in the USA, where it lost 5,7%, in comparison to the same period in 2015.

Volkswagen's sales growth does not signify the immediate return of customers' trust, it was caused by favourable prices of cars offered in all class categories. The approach of the car

dealers needs to be taken into account as well. In the development of the scandal, they altered the prices, fearing that the customers will stop buying the Volkswagen cars in the same amount as before. There are many important steps ahead of the company to gain the trust back.

The supplier of the afore-mentioned software was the Bosch company. The lawyers of the victims suspect that Bosch played a key role in the fraud. Bosch, however, denies it. Bosch produces engine control unit, which is often referred to as the brain of the engine. Bosch supplied the software and components to the VW Group but claims that VW group is responsible for the use of software to deceive the emission tests. Currently, Bosch is declining to comment on the allegations (*Aktuality* 2016).

According to the latest information, Bosh found itself in the centre of the investigation in Germany, where the Stuttgart prosecutor's office has been conducting an investigation since the end of 2015 against the unknown manager of Bosch on suspicion of aiding the fraud. The lawyers and victims of German customers of VW in Germany see only a limited chance of success. They would need to demonstrate a clear intention. "We need material evidence to be able to demonstrate that Bosch supplied the software with the clear intent to cheat," lawyer Ralf Stoll told the German media. "And it will be difficult" (*Autobild Slovensko*, 2016). The case was led by the prominent lawyers Elizabeth Cabraser, Steve Berman, and Michael Hausfeld, who ensured the most amicable settlement when Volkswagen was forced to accept a compensation in the amount of $15.3 billion (€ 13.7 billion). The court in San Francisco saw the next enlargement of the indictment, which states inter alia: "Without the complicity and secrecy of Bosch Volkswagen could not commit fraud and manipulation". According to the portal Automobilwoche, Bosch, based on the file, was the decision maker in the long-term conspiracy, thus becoming co-accused in the upcoming process within dieselgate affair. According to the lawyers, the participation of Bosch in the machinations can be traced back to the late 90s. The contractor is being accused of having knowingly and actively participated in the fraud, and using its marketing and lobbying influence to help get the banned technology to the automotive market in the USA. The accusation is even stronger. It argues that Bosch was involved in the attempt to cover up manipulations when VW provoked the wrath of the US control authorities (*Autobild Slovensko*, 2016).

The "dieselgate" scandal caused changes in the leadership of the company. Matthias Müller became the new chief executive on 25 September. Müller began to completely change a

previously established corporate strategy. His aim was to hire people outside the company, who had had no previous connection to the company. Also, the company carried out major structural changes. The number of managers reporting directly to the director general has been reduced by half. Francisco Javier Garcia Sanz became technical director of Volkswagen Group, replacing Heinz-Jakob Neusser. Frank Welsch became the new technical director of the Volkswagen brand. Moreover, in the first half of 2016, the head of the US division Michael Horn left the company. Due to the fact that the employees of the company have a big share in its management, the changes introduced by Matthias Muller are still faced with great disapproval and occur slower than necessary.

Over the last few months, the automaker has repeatedly established its priority which, for the next few years, will be electromobility (for the reasons relating to "dieselgate"). At present, the automaker is developing several new types of "green cars" like the new Phaeton and Microbus. Volkswagen can already offer the eGolf car, which can travel up to 180 km on a single battery charge. The latest offer is also Volkswagen e-up, also called "people's electric car", which can travel about 160 km on a full charge. This car has a disadvantage on the highway, where at the maximum allowed speed it can travel just under 100 km. That is why this car is particularly suited for city use (*Ecobonus* 2015). Currently, Volkswagen is developing a new version of this car.

The new objective in electromobility, which Volkswagen set by 2025, is to achieve 25% share of sold electric vehicles from its total portfolio. In the coming years, Volkswagen plans to invest tens of billions of euros in electric mobility, mainly for brands Volkswagen, Škoda, Seat, Porsche, Audi, and Bentley. Currently, Volkswagen is not among the main players in this field and produces not very usable cars based on electric power, but with the arrival of the aforementioned models, the situation is changing over time, and Volkswagen has already almost 6% share in the segment of electric vehicle sales (Horčík 2016). There is also concern amongst several operators of charging stations in the United States, who are afraid to invest financial resources in the amount of $2 billion in green infrastructure in the US due to Volkswagen liability, that in addition to the production of electric cars Volkswagen will construct new charging stations according to their own standards and impose their policy on other manufacturers of electric vehicles. On the other hand, there is a current need for single infrastructure, since the charging stations are connected to the particular producers, and Volkswagen's policy could lead to a uniform standard. That would be beneficial for the

users, who could recharge their vehicles anywhere without the use of a variety of cabling and connectors.

Bearing in mind that all these measures, including fines and compensations, will cost Volkswagen a substantial number of funds, the company must look ahead and using the crisis management to search for all reserves and available financial resources. A significant share of this list must belong to the saved resources. The corporation plans to save on wages, bonuses, and advertising. Volkswagen is trying to negotiate a temporary reduction of the price of components from their suppliers. The company plans to save €3 billion in such a way. There is a risk that the suppliers will not agree to this and Volkswagen will have to seek alternative solutions. In order to save funds, the company does not implement several projects, which had been previously agreed on. This damaged several companies which were cooperating with them. In August 2016 two suppliers ceased to supply Volkswagen's crucial manufacturing segments, which urged some factories of the company to halt the car production. The "dieselgate" scandal had a negative impact on the relationship of Volkswagen with their suppliers, which is only expected to get worse.

At the end of August, VW did not avoid a crisis with suppliers. Business management has decided to cancel the contracts with suppliers Car Trim and Automobilguss ES, which are part of Prevent company. The company Car Trim produces seat covers and EE Automobilguss supplies transmission parts. The number of contracts that VW had to cancel without any reason was about 500 million euros. Suppliers have claimed 58 million for the cancellation of the contract, but the VW denied the claim. Cancellation of parts supply was, therefore, a logical result and resulted in downtime of cars VW Golf and Passat. 27 700 employees, representing 10% of the total domestic workforce VW, remained at home. Commerzbank AG has calculated the stoppage at the loss of 70 million Euro per week (Rauwald 2016). Apparently, VW is trying to compensate the losses caused by the scandal of diesel vehicles in the US.

Except for the production of electric cars, Volkswagen devotes a large part of the energy to manufacture of hybrid vehicles. Currently, Volkswagen is facing further suspicion in relation to the company's use of patents of an American company Paice for the production of its hybrid cars. The matter is currently under investigation by the US International Trade Commission (ITC). The decision is yet to be made. Toyota, Hyundai, and Kia were similarly accused in the past, which led to the adoption of license agreements. Ford is presently under

investigation on the same suspicion. Volkswagen Passat GTE and Volkswagen Golf GTE are among the most successful hybrid models.

3.6 General Motors

3.6.1 Company Overview

General Motors (hereinafter GM) is an international corporation based in Detroit in the United States. The company currently employs 215,000 workers and manufactures its vehicles in 35 countries on 5 continents. The corporation includes brands like Buick, Cadillac, Chevrolet, GMC, Opel, Baojun, Wuling, Jiefang, Vauxhall and Holden. The company was founded in 1908 by William C. Durant. Charles Stewart Mott developed it into the world's largest automaker. In 2008 it was declared the ninth largest world company. In 2009, however, it experienced serious financial problems, which resulted in the third biggest bankruptcy in the history of the USA and the biggest bankruptcy of the automotive manufacturers in the world. The first vehicles produced by GM were Buick and, later, Oldsmobile. They were followed by automobiles Oakland and Cadillac. In 1926 it entered the Pontiac group and a little later the Australian Holden. The first European brand to join the corporation was the British automaker Vauxhall and in 1919 the German Opel. World War II was not a very good period for GM, but the automaker compensated for it during the post-war period, when the focus shifted to the modification of luxury cars. During the sixties, GM focused on the production of vehicles for the middle class. The seventies brought about a recession, which GM successfully overcame by producing small vehicles. Similarly, the company survived a recession in the early nineties, mainly due to the production of small trucks and sports cars. Recession in the early 21st century, however, was impossible to overcome and GM declared bankruptcy. After being restructured by the state, the manufacturer focused on the production of its four brands - Cadillac, GMC, Buick, and Chevrolet. By reducing its debts GM even managed to return to equity markets in 2010 (*General motors* 2016b).

Throughout its existence, which is more than a hundred years, GM dominated mainly in the area of innovation. GM workshops created such products as a fully automatic gearbox, catalytic converter, shatter-proof safety glass and electric starter. In addition to the automotive industry, GM penetrated other sectors. GM developed a mechanical heart pump,

a lunar vehicle for the crew of the spacecraft Apollo 15. It also participated in the development of the first computer system in the world (*Aktualne* 2011).

GM recorded a successful year in 2015, reaching a record profit of $9.7 billion, while in 2014 the profit amounted to only $2.8 billion. This difference was caused by the expenses incurred in convening faulty cars in service in 2014. In addition to increasing profits, the global sales increased by 0.2 percent. The company's revenue fell to $152.4 billion, but since the forecasts predicted only about $145 billion of profits, this figure was practically successful. The first quarter of 2016 was similarly successful in terms of profit when GM saw a sharp annual increase. As will be seen from the figure below, it is clear that much of the production is located in the North American domestic market, where the sales are still rising. Conversely, GM recorded a downward trend in Europe and South America. Growth is recorded in other markets, where a major purchaser is, for example, China.

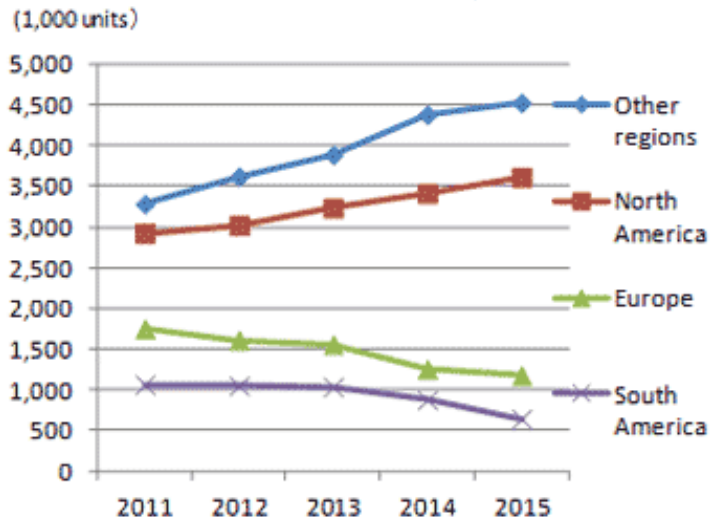

Figure 13 GM car sales according to regions for the years 2011-2015 (*Marklines* 2016)

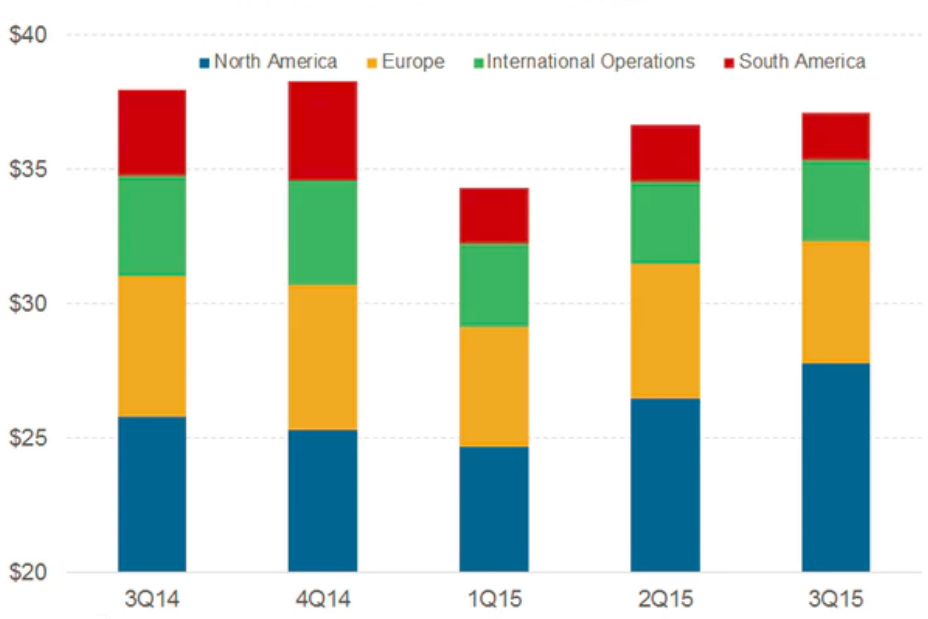

Figure 14 Distribution of GM sales according to regions in millions $ US (O'Hara 2015)

Figure 14 shows that at present, despite the fact that the majority of vehicles sold by GM are recorded in China, the biggest revenues are is still in the United States of America, where the average revenues are more than 60 percent of total sales. The discrepancy between the number of vehicles sold and the revenue is caused by the fact that the USA sells the most expensive car models, while other markets seek efficient models, which, in addition, adapt to price options of the relevant market environment.

3.6.2 Environmental policy of General Motors

The basic principle of environmental policy of GM is the fact that all the production plants of the company function in accordance with common environmental principles, which provide an effective basis for environmental management. GM makes a lot of effort to ensure the protection of human health, natural resources, and the global environment. In fulfilling this objective, the automaker attempts at going beyond the legal framework, and this is what triggers all the business-related decisions made by the company on a daily basis. The company has committed to fulfilling the set objectives for reducing waste and pollutants, protection of natural resources and the maximum possible level of recycling materials in all phases of the product lifecycle. In addition, GM's environmental policy aims at educating their employees and customers about this field. Each production unit of GM has one or more environmental engineers who are supported by the regional environmental team. These teams are supervised by the Global manufacturing organization, which also checks the

fulfilment of the objectives set in this area. The common environmental policy of GM aims at preventing any situations which could cause damage to the environment. In addition, such a system also prevents fines, which could be imposed in the context of environmental policies. Thus, in 2015 the company managed to remove 34 possible cases which could lead to environmental pollution (20 cases in the United States, 14 cases outside the United States). All of GM environment policies are summarized in the Environmental Management System (EMS), which combines the ISO 14001 standard and elements specific just for GM. Due to EMS, it is possible to measure the company's performance in the field of environment and look for further opportunities for improvement. While in the past the EMS was set only for manufacturing plants, as of 2015, it is gradually being introduced to all other branches of GM, which are non-productive by nature. This process will take 12 to 18 months and should be completed by the end of 2016. GM is well aware that the implementation of EMS is based on the people who are responsible for maintaining it, so GM is striving to provide these people with the most efficient training. The training is based on best practices, applicable to all branches without exception throughout the world. But a certain part of the training focuses on the specific situation of a particular country, in a particular field (O'Hara 2015).

Naturally, the objective of GM's environmental policy lies not only in achieving the EMS standard but also in finding innovative solutions, by means of which these standards can be further improved. Here are examples of measures that have been adopted by GM to improve the environment:

1. GM headquarters in Detroit has been converted into a place which recycles all waste and converts it back into energy.
2. An organization of student camps to investigate the possibilities of reducing carbon dioxide emissions. Thanks to them, 36 created projects benefit directly the people in the United States.
3. 122 production plants, which, thanks to 100% recycling, do not produce any waste. GM has invested more than $1 billion in technology providing such a clear evaluation and has saved more than 10 billion tons of CO2 emissions due to recycling.
4. To ensure the possibility of recycling of at least 85% of each produced vehicle.
5. Signing the Declaration on climate protection, where GM committed by 2020 to reduce the energy consumption of equipment by 20%, to reduce the amount of waste by 40%, to reduce water consumption by 15% using cleaners, to obtain 125

megawatts of renewable energy, to introduce 150 waste-less operations and to ensure a reduction of emissions by 20%. Furthermore, the company has committed to maximizing the efficiency of their vehicles by reducing consumption and emissions. The company is planning to achieve this goal by developing cars with alternative power sources (*General motors* 2016b).

3.6.3 SM of General Motors during the tightening of emission rules

GM has taken a number of measures in order to minimize the amount of emissions produced not only in the process of vehicle production but also in vehicle operation. Certain measures that GM implemented have been already indicated in the previous subsection and will be discussed in a bit more detail.

GM management believes, that in the time of the currently appointed rules in the area of emission control, success can be gained not only by copying these rules but their anticipation in the framework of the company's portfolio. For all car producers, high standards in environmental policy have become a part of the marketing and the declaration of the fulfilment of the set objectives can be a very successful tool in car sales. Similar to other companies, GM has been adapting to the situation and has performed several basic steps, aimed at offering “enviro-friendly” cars which would create sufficient demand.

In addition to conventional solutions lying in the development of cars with alternative engine type, GM is also focused on the implementation of other measures that could contribute to the elimination of the total amount of emissions produced. One of them is the new Maven application, the main function of which is carpooling. This application has become available only in Ann Arbor, Michigan so far. It cannot compete with similar applications like Uber and ZipCar yet, but it is outstanding, that GM was the first auto producer to start such service. This market is certainly appealing as more than 25 million inhabitants are expected to share cars in a similar fashion by 2020. The process is simple. Registration is free and the cost of rent is $6 per hour, including the insurance and fuel. This system is quite beneficial. A number of people can use one car. They do not have the necessity to buy their own vehicles and thus the environment is much less affected by the production activity of automotive companies (Šimunek 2016).

Besides the alternative services for the customers, GM also works on the development and sales of alternative drive vehicles. GM is mainly investing in the research and production of

vehicles powered by electricity and has committed to electrification and the gradual conversion of their production processes into the production of clean cars that are fun to drive. One of the best-selling products, sold in Oregon, Maryland, and California, is the Spark EV. This vehicle is very fast due to a torque of 542 Nm. It has 132 km of range with a single battery charge. The vehicle is powered by an electric motor with permanent magnets with an output of 100 kW, which is cooled by oil. This car is equipped with a quick charger, which recharges the battery with direct current at 80% in about 20 minutes while charging with the alternating current from the socket takes 6-8 hours. Two other electric vehicles produced by GM are Chevrolet Volt and Opel Amera, introduced to the market in 2011. Volt was designed for the American market and Amera for the European market. Neither of the vehicles was especially popular, Amera being a complete flop in Europe. Volt is not a conventional electric vehicle and because of its 4-cylinder gasoline engine, it is considered to be a hybrid vehicle. With a single battery charge it can drive as far as 80 kilometres, and then the gasoline engine turns on. Amera works on the same principle, except that the driving range of the battery is up to 60 km. Despite the failure of these vehicles GM was not discouraged and this year the absolutely new Chevrolet Bolt with a driving range of up to 320 km is going into production. Although this car is practically a Volta successor, it is no longer a hybrid vehicle, but runs exclusively on batteries. Its twin, called Ampera-e, is headed for Europe. In addition to these two electric vehicles, GM plans to introduce a new hybrid model Chevrolet Malibu Hybrid. Besides the electric and hybrid vehicles, GM is collaborating with Honda on the research of hydrogen-based drive, which could find application in the aerospace and military industries. GM also offers vehicles running on the base of CNG and LPG (*General motors* 2016c).

GM also offers hybrid cars. GM is especially proud of full-size SUV hybrid cars Cadillac Escalade, GMC Yukon and Chevrolet Tahoe. All of them work in two basic modes. While the first mode is designed for city driving, the other mode is designed for driving on the highway, where the vehicle uses just the electric motor.

The company's strategy in the development and sales of “green vehicles” is a long-term care of customers, who are constantly informed by GM about new technologies which are coming to the market. Since 2002, GM has registered 700 patents in this area, which is more than any other company. Within the patent ranking, GM is recognized as number one since 2012. GM has been in the top five since 2007 when the ranking was created. GM has set a goal to introduce more than 500,000 electric cars to the American roads by 2017. In 2015 more than

half of this number was accomplished. Similar targets were set in other regions, and an increased care for the customers and operators of such vehicles was registered. In addition, the objective of GM is to use new types of materials that enhance the aerodynamic performance of vehicles and are environmentally friendly. Moreover, the current work is set around the engine enhancement, which, for example, during cold start, is able to reduce emissions by 25% and the total fuel consumption by 2-3%. GM is constantly attempting to reduce the total weight of the vehicles, which affects the total consumption of fuel, electricity or other alternative drives. All these steps have enabled GM since 1970 to improve the fuel efficiency of passenger cars by 180%, and for trucks by 93% (*General motors* 2016d).

3.7 Customer analysis

3.7.1 Survey questionnaire method

As it has already been mentioned above, to assess whether the direction of SM of automobile manufacturers in the context of tightening standards on emissions fully complies with the requirements of customers it was necessary to carry out a questionnaire survey in which the potential customers are approached and asked questions, aimed at revealing the extent to which their choice of a new car is based on environmental parameters. A further aim was to find out the customers' perspective of the future of the alternative types of drives in the current state of the supporting infrastructure.

The sample consisted of 50 respondents of different age, who were contacted directly. Both men and women are represented. The questions in the questionnaire were as follows:

1. Your gender
   □ Male
   □ Female
2. Your age
   □ 18 – 30
   □ 31 – 44
   □ 45 – 60
   □ 60 and older
3. Do you consider the level of produced emission a decisive parameter when choosing a vehicle?
   □ Yes
   □ No
4. What do you consider the most decisive parameter when choosing a vehicle?

□ Price
□ Brand
□ Emission level
□ Technical characteristics (including consumption)
□ Other (specify)

5. Which vehicle of the same price, the same producer and the same basic characteristics would you prefer?
□ A vehicle with petrol engine
□ A vehicle with diesel engine
□ Alternative drive vehicle (hybrid vehicle, electro vehicle, gas, hydrogen...)

3.7.2 The results of the questionnaire survey

The results of the questionnaire survey are briefly summarized in Table 5.

Table 5 The results of the customer questionnaire survey (Made by author according to the source)

Questions	Options / Group	Men 18-30	Men 31-30	Men 45-30	Men 60 and older	Women 18-30	Women 31-30	Women 45-30	Women 60 and older
The number of respondents in the group		9.	12.	7.	2.	6.	6.	6.	2.
Do you consider the level of produced emission a decisive parameter when choosing a vehicle?	Yes	4.	9.	5.	0.	6.	5.	5.	1.
	No	5.	3.	2.	2.	0.	1.	1.	1.
What do you consider the most decisive parameter when choosing a vehicle?	Price	4.	3.	2.	1.	3.	3.	3.	2.
	Brand	4.	4.	4.	0.	2.	1.	2.	0.
	Emission level	0.	0.	0.	0.	0.	0.	0.	0.
	Technical characteristics	1.	5.	0.	1.	0.	1.	1.	0.
	Other	0.	0.	1.	0.	1.	1.	0.	0.
Which vehicle of the same price, the same producer and the same basic characteristics would you prefer?	Petrol	8.	6.	0.	2.	1.	3.	4.	1.
	Diesel	1.	4.	6.	0.	1.	1.	1.	1.
	Alternative drive	0.	2.	1.	0.	4.	2.	1.	0.

30 men and 20 women in four different age groups participated in the survey. They were asked three different questions aimed at revealing their attitude to the emission reduction policy in relation to buying a new vehicle. At this point, it is fair to mention that the results of the survey may be somewhat misleading, as the survey was conducted with the citizens of Slovak Republic, who are not yet aware of all developments in the sphere, as, for instance, in the United States and Western Europe. A survey carried out in those countries are likely to produce different results.

The survey clearly states that for the majority of the respondents the emission control is one of the decisive factors when choosing a vehicle. 64% of the respondents answered positively, and 36% of the respondents do not consider this parameter as decisive. This parameter is more important for women than for men, as only 60% of men answered positively. 85% of women responded positively. It is a crucial parameter particularly for young women in the category of 18-30 years, and for middle-aged men. Although the majority of the respondents chose emission factor as important in the choice of a vehicle, it is not the most important parameter. The most important were other criteria such as price, brand, technical and design characteristics. While younger men settled for the brand and price, middle-aged men took the technical parameters into account. Women do not pay a lot of attention to technical characteristics, most often the decision is based on the price, sometimes brand of the vehicle.

The last question concerns the potential of the producers of alternative drive vehicles in the Slovak market. The question was designed to reveal the real attitude of the respondents to the alternative drive vehicles. Therefore, an equal status was given to the parameters of price, basic technical characteristics, and brand. The respondents were able to truly express their attitude to this type of vehicles. But nevertheless, a general distrust of Slovak people was apparent towards the cars to which the future belongs. The men of all age categories, mainly aged 15-30, expressed their distrust more strongly. Only 10% of men would prefer a car with an alternative drive. More than 53% would prefer a car with a petrol engine and the remaining 37% with diesel engines. The situation is slightly better for women, as 35% of them prefer the alternative drive to petrol or diesel. Mainly young women aged 18-30 years tend to choose alternative drive cars, which is exactly the opposite of the pattern of behaviour of men in the same age category. For women, the older they are, the less priority is given to such models of cars. When analysing the last question, it was revealed, that most respondents prefer petrol engines, and the diesel engines receive more negative attitude from women than from men.

4 EVALUATION OF THE RESEARCHED ISSUE

4.1 Assessment of the results of the mutual comparison of supply and demand

Upon initial glimpse at the results of the analysis of supply and demand, it is obvious that they are not currently in full compliance. In other words, the supply currently exceeds the demand. There is some interest in the new types of vehicles, but considering the fact that their development is still in its infancy, this demand is not and cannot be massive. Emission standards, nevertheless, continue to tighten. The fact that emission standards are not the most important parameters for the customers was proved by the "dieselgate" of Volkswagen AG. The company's poor decisions brought an only short-term drop in demand for vehicles with petrol or diesel engines, and very shortly after the scandal outbreak the demand began to grow again. Nor did the scandal result in increased demand for vehicles with alternative drives, such as electric or hybrid vehicles. The customer attitude to the achievement of emission standards is documented in a conducted questionnaire survey, which, however, replicates the behaviour of the customers of Volkswagen. The customers pay more attention to the price of the product and remain faithful to the brand due to other technical parameters and tradition.

Worldwide sales of electric and hybrid vehicles grow annually, as evidenced by the following figure, but it is still only a small percentage of the total cars sold.

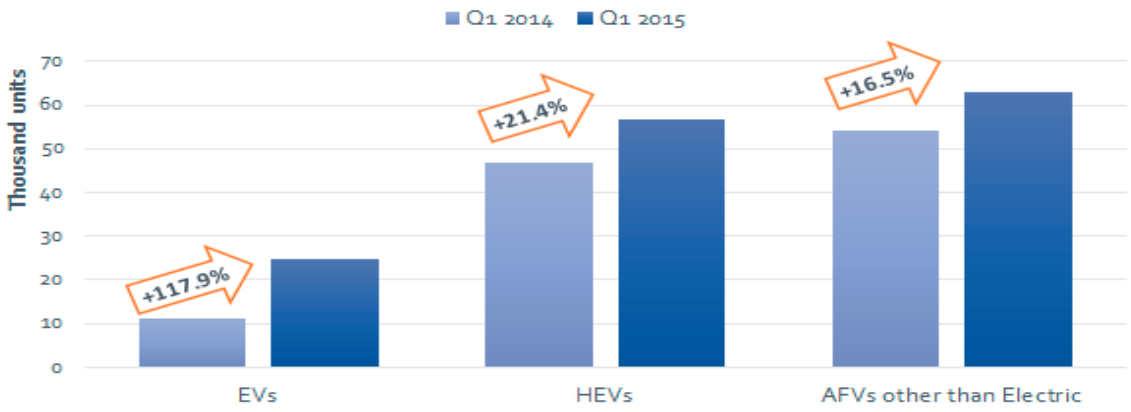

Figure 15 The development of alternative fuel vehicle sales between the first and the second quarters (*Acea* 2015c)

SM of automobile manufacturers has reached the stage when it is not able to keep up with the constantly tightening emission standards, mainly through the adjustment of diesel engines. From 2017 onwards, the newly tightened standard of Euro 6.2 will apply and further restrict emission of NOx gases. The standard will apply to all new vehicles to be sold in Europe starting from 2017. As of 2020, the standard will likely remove the majority of vehicles with diesel engine since the car producers will find it hard to produce diesel cars that emit a maximum of 80g NO_x/km. Car manufacturers declare that they cannot fit below 130g NOx/km. This fact hardly means a big future for diesel vehicles. Petrol engines are likely to expect a similar fate in the future. It is no wonder that automobile manufacturers have been for long investing considerable funds into the development of alternative drives. This route seems inevitable.

It is clear that the research and development of alternative drives do not happen with the speed imagined by political leaders of various countries, who set the emission standards along with developmental standards of vehicles. The process of tightening the standards occurs at a much higher speed in this area. There is a future threat of such tight rules which would cause a rapid shortage of cars able to meet the standards in the market. Even providing the biggest effort, the automobile producers will be only able to deliver the vehicles that do not meet the technical parameters, powered by traditional diesel and gasoline engines. The corporations are currently introducing different models of cars that meet emission rules, but often at the cost of reducing the comfort provided by other vehicle characteristics. It is, therefore, not surprising that among customers there is initial distrust towards such models of cars and vehicles with alternative power sources do not get considerable attention. The manufacturers of such types of vehicles are still a long way from battling the customers' distrust.

Vehicles with alternative power source have various advantages along with many disadvantages that present research has not managed to eliminate yet. Most automakers see the future in electric cars. Billions of euros are allocated to the research of this type of technology. At the same time, the research results encourage the production of new, constantly enhanced models of vehicles. By means of marketing, they are sold through the demonstration of their benefits, which cannot be overlooked. These benefits include:

- Reduced emissions,
- Satisfactory acceleration rate,

- Long life expectancy,
- Easy maintenance,
- Low noise level,
- Engine efficiency.

When listing the advantages, it is logical to wonder why the sales rate of these vehicles, despite powerful marketing, is lower than expected by the producers. The arrested development and research in this area outweigh the advantages of the vehicles by evoking a negative context associated with them, which is definitive for the customer. If the producers fail to eliminate this association, the sale of these vehicles will remain a minor issue. Moreover, due to the indifference of the public and insufficient infrastructure, the vehicles are produced in small sets, which results in a higher final price of the car compared to similar diesel or gasoline vehicles. Another disadvantage is the limited driving range of the vehicles, making them inconvenient for longer journeys and suitable purely for city use, which discourages the potential customers. The fundamental reason for the restricted driving range is the state of research in the field of battery energy storage. Despite progress, it is far from providing the electric vehicles with the driving range of vehicles with a conventional power source. A possible alternative is rapid charging, which, however, substantially reduces battery life. The problem lies in the charging time, which even with the help of rapid charging lasts at least 15 minutes. This creates a time constraint, during which the vehicle cannot be used. The traditional charging time is 6 hours, which is completely unacceptable for many customers. A possible alternative is the replacement of the battery box. However, in comparison with restocking the vehicles with petrol or diesel engine, it is time-consuming and, mainly, impractical.

A fundamental reason for insufficient interest in electric vehicles in Slovakia is the lack of rapid charging stations. Hardly anyone buys an electric vehicle if there is no possibility to charge it during driving. In Western Europe, the network of charging stations is expanding. Despite the small number of electric vehicles in Slovakia, the network of charging stations is being built also there, mainly along the motorways and expressways. Nevertheless, to ensure customers' interest in buying electric vehicles, it is crucial to provide a system similar to the network of filling stations for petrol and diesel engines.

As mentioned before, one of the advantages of electric vehicles is the reduced noise level. On the other hand, this feature may be not just beneficial, but in some cases a disadvantage which may cause various dangerous situations. In recent years, a number of analyses have been performed, which confirmed that low noise level is a major risk for people with reduced visual abilities. Noise from the roads helps them to orientate. Noiseless cars can cause accidents for such pedestrians. At present, the United States and Europe are preparing a legislation that would establish a mandatory minimum level of noise that all electric and hybrid vehicles would have to meet.

A certain alternative that can at least partially eliminate some disadvantages of pure electric vehicles is a hybrid vehicle and a plug-in hybrid vehicle. Hybrid cars are powered by internal combustion engines fuelled by fossil or other fuels, as well as an electric motor powered by a battery by means of regenerative braking. It is a mechanism which involves an electric engine acting as a generator. The generator puts resistance on the wheels, which produces electric energy together with slowing down the vehicle. Plug-in hybrid cars can recharge their batteries from the external power supply, while the classic hybrid cars cannot. Both types of drives, however, offer a great advantage over purely electric vehicles, together with a much longer driving range. This range can sometimes surpass the driving range of conventional diesel or gasoline engines. Regardless, these vehicles cannot produce zero emissions, as compared to purely electric vehicles.

Whereas the operation of purely electric vehicles generates zero emissions, their production impacts the environment by extraction of a number of precious minerals that are necessary for the production of advanced electric motors, batteries and other components of these vehicles. The extraction is both environmentally and financially burdensome. Besides the direct impact on the environment, the clean electric vehicles and plug-in hybrid vehicles cause indirect pollution of the environment. Due to the fact that these vehicles can be recharged with the external charging networks, they use the electric energy, which had been produced in electric power plants. This means that until the electric power originates from renewable energy sources, the issue is not about reducing emissions, but about switching from vehicle operation to the power plant operation.

Regarding the list of disadvantages connected with alternative vehicle drives, the results of the questionnaire are no longer surprising. They only emphasise the fact that the infrastructure and supply of vehicles with an alternative power source is rather limited in

Slovakia, and in some regions is not present at all. Even though the situation in Western Europe is significantly better, it is far from the necessary level. For many years, the automotive companies have invested tens of billions of euros in research and development of alternative power sources of vehicles, as well as billions of euros into the promotion of the results. Nevertheless, their marketing tools will be successful only if they follow a certain set of principles.

4.2 A set of recommendations to ensure the transition to a green way of vehicle operation

It has already been stated in the previous sections of this thesis that SM and strong marketing will be insufficient unless they are offered the right product which would meet the requirements of clients. In terms of "enviro-friendly" vehicles, however, such a product cannot yet be spoken about. Development in the field has been continuing for almost 20 years and in recent years it has become quite intensive, but the progress is insignificant. The question arises whether it would be more appropriate to switch to the research of other fuels, hydrogen-based fuels or biofuels. These fuels may play an even greater role in the future than vehicles powered by electricity.

All these alternative fuels directly contribute to the fact that at some point carbon impact of transport will be eliminated. These fuels carry a great potential, but, as it has been mentioned several times, they face low consumer demand due to poor infrastructure, high prices for vehicles and their far-from-perfect qualities.

This creates a vicious circle, as in the event of infrastructure development, the alternative-drive vehicles improvement is expected as well, which may cause an increased demand for vehicles of this type. It is well known, that unless the infrastructure is developed, the customers will not be willing to buy such vehicles, even despite their perfect characteristics. They would rather prefer to buy a vehicle which is not entirely organic but provides the necessary level of luxury in the use of the infrastructure.

With increasing population and the use of transport, the policy of emission reduction is appropriate. Still, the timing and manner of its enforcement in the automotive industry have in the past decade been exaggerated and not in line with the state of research into alternative drives. Given the aforesaid pace, there is a real threat, that at a certain point the car

manufacturers will no longer be able to meet emission standards set for the conventional gasoline and diesel engines, and development of alternative power sources will not have reached the required level yet. Consumers will be forced to buy vehicles that are real, not the vehicles they identify themselves with. They will also experience all negative characteristics of these vehicles, including a lack of infrastructure.

It is, therefore, essential that manufacturers of vehicles with alternative drive participate in building a complex network of charging or gas stations. The structure and technical parameters of the infrastructure must be discussed with automakers for the purpose of ensuring compliance with the uniform standard, as is the case with gas stations of traditional fossil fuels. Only such a universal network will guarantee consumers' interest in buying the next generation vehicle. Automobile corporations have to spend all their energy on slowing down the application of stringent emission standards. They want to be given sufficient time to research new alternative fuels and not to run under the relentless pressure of deadlines. High-quality research also demands sufficient time, which politicians are obliged to provide for the car manufacturers in such an important issue.

However, currently, most car manufacturers focus on a completely different kind of lobbying, and their leaders are pressuring the leaders of the European Union to declare biofuels and not just electric cars as the power source of the future. This approach can be somewhat understood. A significant amount of financial resources and time has been invested into research and development of electric vehicles and insofar it has not brought the expected results. Volkswagen, together with Shell, are the main car producers to pressure the representatives of the European Union. Together they published a study entitled “Auto Fuel Coalition”, which was created by the consulting firm Roland Berger. The study was supported by the corporations Daimler, Honda, Toyota and other oil and biofuel companies. This study, however, strongly contradicts a recently published EU study which claims that biofuels would produce three times the emission levels, as is the case of the present use of oil (*Hlavne spravy* 2016).

Our task is not to find out which case is true. In any case, it appears that biofuels would have been a certain step backwards in a developed country. Alternative types of power source have a potential, which needs to be used. It is difficult to fight the oil companies, which always argue for the usage of fossil fuels, but it is one of the fundamental tasks of any car manufacturer from the perspective of environmental protection. The task of politicians

is to provide the producers and researchers with any form of assistance so that the customer is offered a final product which would meet all the technical parameters of vehicles using fossil rules but with a much better impact on the environment. Once this critical objective is met, it is safe to say that the results of a similar survey questionnaire to the one that has been developed for the thesis, will be more lenient to the alternative power sources.

All of the above-mentioned issues can be understood essentially as a solution to a problem that really exists. The issue under investigation must be understood as a particular project, the solving of which requires the usage of elements of project management. The project aims at transitioning to environmentally friendly means of propulsion, which will meet not only the requirements of the emission standards but also customer requirements. It is also imperative to set realistic deadlines, which would help to achieve the set objectives by means of funds, materials, and human potential. In large multinational companies, however, the implementation of project management requires a higher level of its application through the use and integration of various advanced methodologies that are flexible and adaptable to different types of projects. Such methods clearly define individual roles and enable detailed planning process. Their advantage is the possibility to use the project management processes so-called “Best Practices”.

5 CONCLUSION

This thesis provided a brief insight into how the automotive industry aligns with the constantly tightening emission rules. By examining the world's largest automotive manufacturers, we have become familiar with the tools that these companies use to ensure maximum sales of cars that meet the strictest criteria in the environmental field.

The purpose of the paper was to evaluate the fact that the development in the automotive industry is consistent with the established emission rules in line with customers' expectations. The objective was met, as the policy of most major automakers of the world is in accordance with the plan to reduce the production and emission of harmful gases, which is part of the common global policy in this area. Also, attempts in research and development, resulting in the first car with a new type of drive, try to take into account all current customer requirements. On the basis of the prepared questionnaire, a suitable ratio between performance, cost, and environmental considerations is included.

Part of the assessment of this thesis, however, is the fact that today the demand for alternative vehicles is not at a level imagined by manufacturers and retailers. This fact is caused by the complexity of the issue and the related research. Nevertheless, every day new findings appear which this research discovers. It is certain, that soon the world will see cutting-edge construction system, thanks to which the negative impact of transport on the environment can be sufficiently reduced.

The automakers are facing a challenge of having to come up with a solution that would finally meet the customers' expectations in a very short time. Whoever arrives at such a solution first, will have a possibility to become the leader in the global automotive industry. This opportunity is worth fighting for.

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