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INTERNATIONAL BUSINESS – CENTRAL EUROPEAN BUSINESS REALITIES



**Automobile Aftermarket Customization and
its Trends with an Emphasis on the Potential
for the Czech Market**

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Declaration

I hereby declare that I am the sole author of the thesis entitled “Automobile Aftermarket Customization and its Trends with an Emphasis on the Potential for the Czech Market “. I duly marked out all quotations. The used literature and sources are stated in the attached list of references.

In Prague on.....

.....

Signature

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Abstract

The aim of the thesis is to provide an overview of the automobile aftermarket customization and evaluate its potential on the Czech market. The first goal is to understand why product design is crucial for consumers in general and to highlight its importance for automobile industry. Moving forward, the historical development of the automotive design with emphasis on external factors influencing technical and design development and, consequently customers' preferences is provided. In order to analyze the potential of the customizing companies in the Czech Republic, a research among several Czech and German modifiers was conducted. The outcomes of the research enabled to draw the conclusions and evaluate the actual potential of automobile aftermarket modification.

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List of abbreviations

AG	Aktiengesellschaft (Joint Stock Company)
BMW	Bayerische Motoren Werke
BT	Benet Automotive
CAD	Computer Aided Design and Drafting
CAS	Computer-Aided Styling Software
DTM	Deutsche Tourenwagen Masters
GDP	Gross Domestic Product
GM	General Motors
GmbH	Gesellschaft mit beschränkter Haftung (Limited Liability Company)
MG	Morris Garages
MUV	Multi Utility Vehicle
OPEC	Organization of Petroleum Exporting Countries
PSA	Peugeot and Citroën
R&D	Research and Development
SAIC	Shanghai Automotive Industry Corporation
SEAT	Sociedad Española de Automóviles de Turismo
U.S.	The United States
UK	United Kingdom
WRC	World Rally Championship

INTRODUCTION

Ever since the automobile fulfilled its functionality and became affordable to masses, the owners started to consider design and performance as a way of differentiation. Mainly after the end of World War II, the aspect of design started to get more and more attention of the audience. It consequently attracted many automobile lovers, usually coming from auto race sphere, who desired to have an extraordinary vehicle. Some of them even saw it as a potential for making business. This is considered as the beginning of the professional automobile customization. Nevertheless, the automobile aftermarket customization is a very niche market in comparison to the automobile industry in general. The modification of automobiles has always been in scope of interest of many companies specialized on complete or partial automobile tuning. Some companies even became either a substantial part of the automobile manufacturers or their suppliers. Most importantly, the aftermarket customization offers to customer something which he/she cannot get from the original producer such as design differentiation and improved performance power.

The purpose of the thesis is to provide an overview of the automobile aftermarket customization and to evaluate its potential on the Czech market. In addition, this thesis has three specific aims. The first aim is to understand why product design is crucial for consumers in general and to highlight its importance for the automobile industry. Moving forward, the second aim is to provide the historical development of the automotive design and to emphasize which external factors influence technical and design development and , consequently customers' preferences. Finally, the third and the main aim of this thesis is to evaluate potential functioning of the aftermarket customization in the Czech Republic based on a research conducted among several customizing companies, mainly located in Germany.

The first chapter will start with the product design theory which is going to be based on the elaboration of roots and origins of the design itself. Additionally, the history of industrial design will explain the reasons why customers enjoy nicely looking products. After that, the effects of technological changes are going to be considered in order to find correlation and relationship between functionality and appearance which will be followed by the factors influencing product design. Moreover, these factors will be explained by

the outcomes of the industrial revolution, and an additional explanation of the impacts on designing process of current technological innovations, computers and particular software will be provided. Finally, the chapter will lead to the observation and categorization of internal and external factors affecting any consumer good which product designers need to consider when developing a product. Last but not least, the first part will aim to serve as a background for understanding the main effects on the automobile industry itself as the vehicles are the core business of the automobile aftermarket customization.

In the second chapter, the development of the automobile industry and its role in the society will be described. The chapter is going to consider two main perspectives: design and technological innovations which will be explained by the chronological categorization of development of the automobile industry. It will show the external factors which affected the innovations in each period of time. Moreover, different development stages will show the trends for each particular era. Furthermore, various types of passenger vehicles are going to be categorized in order to provide a complete overview of all potential automobiles for customization. As the modification of cars is actually considered as repackaging, the styling development cycle will be presented in order to understand the design process, emphasizing the internal and legal factors influencing the product development. In the end of this chapter, external and internal effects on the automobile industry should be clearly demonstrated as it is of crucial importance for later customization of automobiles.

The third and the main chapter will consider the automobile aftermarket customization itself. This part starts with an analysis of German automobile customization market including calculation of estimated size of the market. The calculation will be conducted in order to develop a pattern for estimation of the potential of the Czech market. Furthermore, the chapter will show which auto manufacturers are mostly customized and why, which will lead to further application for the Czech market as well as to the suggestions about which automobile brands and their models should be mostly customized by the Czech modifiers. In addition, different areas of possible modification will be explained in order to select which automobile parts the tuning companies can customize. After the observation of individual modifiable parts, the established styles of tuning will be described, leading to various approaches and possibilities of passenger

vehicle customization. One of the last subchapters will deal with different methods of automobile tuning which significantly influences the current trends of automobile aftermarket customization from both design and performance perspective. Lastly, the target market characteristics, purchase behavior, potential risks and threats for the business will be examined. All of the findings mentioned above will lead to the evaluation of the aftermarket customization potential of the Czech market.

Regarding the methodology and literature, the theoretical part will be based on books, journals and scientific articles about industrial design, automobile development, and customer preferences in order to observe internal, external and legal factors influencing actual design and performance of passenger vehicles. Moreover, websites and magazines specialized on automobile segment will be reviewed in order to understand the basic concepts of the automobile customization.

As for the practical part, the visual observation of 86th Geneva International Motor Show (2016) will provide an overview of the current situation of the customization market and its trends. For the purpose of imparting deeper and more relevant information about design, performance and automobile aftermarket customization environment, in-depth interviews with the representatives of four automobile customizing companies, and two passenger vehicle producers will be collected. Finally, the outcomes of the interviews will be a basis for the final evaluation of the future opportunities of customization on the Czech market.

1 CUSTOMIZATION ROOTS

In the current world of mass production and broad scale of products available for all the potential customers, the trend of customization of those products arises in order to differentiate one product from the other. Customization is well described by its synonym, personalization of a particular product. In the light of a consumer desire for the customization, designers and marketers realized the growing interests of the customers to create their own, unique, special products, and also their willingness to personalize special products based on their desires¹

The desire to differentiate can be dated back to the Middle Ages and Renaissance when the phenomena of sumptuary laws were accepted. These laws imposed restrictions on dress and the purchase of commodities for some members of the society. It means that people with power and financial possibilities wanted to differentiate themselves from others (e.g. common people) and show what they can afford in order to look different than the rest.²

For instance, Michael Dell is considered as a great example of personalization success. His company, Dell Computers, smartly used its build-order-strategy, and thus successfully proved how complex manufactured products can be customized in order to satisfy diverse needs and provide a unique value for customers³. Other inspiration may be observed in the apparel companies such as Converse or Nike, which enable their customers to customize their purchases by providing a variety of possible stylistic choices. These, in the end, help to create a complete brand image.⁴

Another reason why people like personally customized products, comes already from the Maslow's hierarchy of needs and it is the part of self-actualization needs. Self-actualization is closely related to the topic of differentiation because it is defined as a desire of becoming more and more what a person truly is and to achieve everything that

¹ Kimmel, A. (2015). *People and Products Consumer Behavior and Product Design*. New York, NY: British Library Cataloging in Publication Data, p. Customization and consumer personalization.

² Raizman, D. (2004). *History of modern design Graphics and Products since the Industrial Revolution*. London: Laurence King, pp.10-12

³ Kenneth L. Kraemer, Jason Dedrick,, (2000). Refining and Extending the Business Model With Information Technology: Dell Computer Corporation. *The Information Society*, 16(1), pp.5-21.

⁴ Beech, J. and Chadwick, S. (2004). *The business of sport management*. Harlow: Pearson Education, pp.151-152.

one is capable of. Overall, the customization can be also determined by subcategories of “richness” and “beauty” which are based on a feeling of differentiation, complexity, uniqueness and many others.⁵

Since the past decade, consumers started to be more aware of customized consumer products. The basics of personalization can be found already in the modification of easily affordable goods such as shoes, t-shirt or smartphone cover. However, even luxury or high premium goods are those which consumers desire to personalize according to their will in order to differentiate themselves from the others.⁶ Therefore, customization, in other words personalization or modification, relies on two main principles. Firstly, a desire to improve the particular function, and secondly the need to increase the likelihood of appearance where the design plays one of the most significant effecting factor.⁷

1.1 Development of design

The design from the customers’ perspective, as we know it nowadays, can be described as an appearance of consumer goods. Moreover, the literature defines it as the industrial design, or uses the term “modern” design. The definition can be tracked back to the beginning of the eighteenth century with an introduction of mass production and mass consumption. In description of its fundamental features, it assumes that such products serve as signs of extra desired benefits, often having little to do with the actual needs or principal function of the product. That is why consumers purchase goods like wristwatches or smart phones for such reasons which go beyond their needs - just to get to work or school on time; or to communicate with each other – but the customers are rather willing to have a functional nice looking product. Therefore, design may also be considered as the visible expression of values and attitudes.⁸

⁵ Goble, F. (2004). *The Third Force: The Psychology of Abraham Maslow*. 1st ed. [ebook] pp.57,63.

⁶ Spaulding, E. and Perry, C. (2013). *Having It Their Way: The Big Opportunity In Personalized Products*. [online] Forbes. Available at: <http://www.forbes.com/sites/baininsights/2013/11/05/having-it-their-way-the-big-opportunity-in-personalized-products/#1862a5eb7036> [Accessed 11 Jan. 2016].

⁷ Spaulding, E. and Perry, C. (2013). *Making it personal: Rules for Success in Product Customization - Bain Brief*. [online] Bain.com. Available at: <http://www.bain.com/publications/articles/making-it-personal-rules-for-success-in-product-customization.aspx> [Accessed 11 Jan. 2016].

⁸ Raizman, D. (2004). *History of Modern Design: Graphics and Products Since the Industrial Revolution*. London: Laurence King Publishing. p. 12.

For understanding the customization and personalization, it is important to recognize what the design is. Design has been already academically defined in 1911, and its basic definition is valid until today. Design stands for the features of shape, configuration, pattern or ornament used for a finished tangible good, which may be judged solely by the eye.⁹ Design itself does not consider the principle of construction or substance of mechanical device, but rather is trying to make it look prettier, with an emphasis on aesthetics and ergonomic principles.

1.1.1 Origins of design - art, architecture

It can be seen already from the history, before the current definition of design was settled, that the design and its role in the society were important. The roots can be found in our ancestor's actions. Architecture, art and other visually improved products, such as jewelry or clothes, are considered as the origins of industrial design. If a particular person had resources to build, create, or improve a tool, which would lead to have a better, nicer, or more comfortable life, and additionally represented their attitude or status in the society, a person was willing to acquire it.¹⁰

Because of that, the architecture is taken as the highest, absolute form of art and functionality. As Jan Kotěra's architecture theory states, the purpose of a house is not only to be a tool for living but rather to represent an absolute art. It means that exterior and interior of a building should follow one style. In other words that furniture, painting, decoration and other art tools should correspond with a particular style, thus creating one unique look and impression.¹¹ Modern architecture theory describes architecture more or less as a surrounding area delivering comfort. Nowadays, consumers usually demand from architects one simple thing: "to enjoy all the comfort that money can buy."¹²

⁹ Venkatraman, S. (2010). *Understanding designs act*. New Delhi: Universal Law Pub. Co., pp. 5-6.

¹⁰ DeJean, J. (2010). *The Age of comfort*. New York: Bloomsbury.

¹¹ Alofsin, A. (2006). *When Buildings Speak. : Architecture as Language in the Habsburg Empire and its Aftermath, 1867 - 1933*. Chicago: The University of Chicago Press, pp.250-252.

¹² DeJean, J. (2010). *The Age of Comfort: When Paris Discovered Casual and the Modern Home Began*. New York: Bloomsbury.

Previous paragraphs support the well-known theory that when a shelter is secured and the basic needs are fulfilled, people tend to seek achievement of higher goals within the Maslow's pyramid. The higher goals include more comfort or better style which can make a life way nicer but mainly different from lives of the others. Often are designers given information which proves that not only the functionality of living in a building is important, but that the customers desire to have something with added value on the original functionality.

1.1.2 History of industrial design

The term and the symbolic name, industrial design, come directly from the period of industrial revolution which was a time when industrial tools started to be considered as the key aspects of manufacturing. Later during the revolution, designers started to realize the importance of appearance and ergonomics with a focus on required functionality of industrial tools and goods. Before that, the function of the tool was the ultimate and the only condition when designing a product.

The fundamental principle of industrial design is described as a professional service which builds products and systems with an emphasis on optimizing a function, value and appearance for the easier usage for a user and a manufacturer. Those professionals developed products based on a specific analysis which is guided by the manufacturer's or client's requirements. Making a use of drawings, models and descriptions, design specialists aim to find the best functional and looking shape fulfilling a given final performance. Moreover, in order to create and design the desired product, designers need to co-operate together within multi-disciplinary groups that consist of management, marketing, engineering and manufacturing specialists.¹³

Looking back to the process of industrial revolution, cities and towns grew to be at the central focus of industrial and commercial activity. The rapid increase in supply and demand of goods and furnishings triggered the change in production and consumption. In the 19th century, the world experienced an expansion of manufacturing production,

¹³ Evans, M. (2014). *What Is Industrial Design?*. [online] Industrial Designers Society of America - IDSA. Available at: <http://www.idsa.org/education/what-is-industrial-design> [Accessed 17 Apr. 2016].

specifically in textiles, cast iron, the construction of railway engines, and rolling stock. The change of production and trade caused the competition to grow in a fast pace leading to over-production and high competitiveness within a particular market. In addition, one of the most negative outcomes of industrialization was tied labor class, long working hours, monotonous routine of a factory system accompanied with undesirable living.¹⁴

Throughout the nineteenth century, when urban populations were exposed to challenges in terms of housing, sanitation, unemployment and safety, deteriorated relationships among different social classes and related cultures started to be more and more obvious. That is why these struggles actually triggered the armed conflict between working-class and stronger central authority. On the other hand, thanks to this dispute, current intelligence and a part of a social class of industrialist, merchants, and other professionals started to think about so called “*Design Reform*”, in order to understand and transform living and working conditions of common factory workers. Along with the industrial wealth, a desire to shape the values of current diversified society reinforced, and therefore addressing the issues of social and economic welfare for all inhabitants started to be a widely discussed topic. Such attitude took a variety of forms - beside the obvious such as politics and economics, also the role of arts was significant. All the reforms began with the education of designers, and consequently continued with establishing the standards for taste in the public interest.¹⁵

Early design reforms created standards and models for designers which manufacturers could easily follow. Moreover, reformers emphasized the usage of technology, new materials (mainly metals and casting) and aimed at setting standardized guidelines. Besides that, other reformers tried to enhance the attention of moral and ethical implications of design but ignored the taste and motivation of consumers. Additionally, there were some reformers' groups who regarded design as a necessary education, in order to achieve perceptions of appearance as an important part of a consumer good.¹⁶

¹⁴ Raizman, D. (2004). *History of Modern Design. Graphics and Products Since the Industrial Revolution* London: Laurence King, pp.45-47

¹⁵ Raizman, D. (2004). *History of Modern Design: Graphics and Products Since the Industrial Revolution*. London: Laurence King Publishing. p. 45-47

¹⁶ Raizman, D. (2004). *History of Modern Design: Graphics and Products since the Industrial Revolution*. London: Laurence King Publishing. p. 48

1.1.3 Impact of industrial revolution on design

Since James Watt, in the late 18th century, developed steam engine, which was subsequently highly applied in production, the basic principles of manufacturing process completely changed during the 19th century. The new technological progress caused the shifts in society as well as in the manufacturing approach. In the first instance, traditional manual laborers learned that the new steam engine machines are able to replace the manual craftsmen in a more productive way. Due to the development of steam engine, faster and cheaper production was achieved but often with greatly inferior results. At the beginning, this process decreased the value of the critical eye and artistry which were sacrificed for the increasing speed of production at lower costs. In those days, the workers operated the machine by filling it with raw materials in order to get the final product. Therefore, in the early stages of the industrial revolution, the functionality was the ultimate factor.¹⁷

Another design forming factor, mass production, already oriented on specialization, effective division of labor, and standardization of products' parts for the manufacturing of goods and all of the aspects mentioned above significantly influenced the overall development of design. New production strategy evolved and allowed to increase the output at low unit cost, even with lower costs expected as the volume steadily grew. The application of mass production methods has brought major improvements in the cost, quality, quantity, variety of goods, and made them more affordable for common people.¹⁸

A great example of successful mass production utilization is the influence of Henry Ford who increased working hours from 8 to 9, raised wages but mainly applied assembly line system of production which led to rapid speeding of the production process. For instance, the black color was the only possible color of a car due to standardization of the production and faster drying of the painting. Thanks to that, model "FORD T" has become one of the most selling vehicles of all time with almost 15 million pieces sold. Next interesting fact, not typical for the beginning of the 20th century, is that Ford's cars were not supposed to represent luxury or self-actualization, but rather should have only

¹⁷ Designhistory.org, (2016). *The Origins and Impact of the Industrial Revolution*. [online] Available at: http://www.designhistory.org/Arts_Crafts_pages/IndustrialRevolution.html [Accessed 19 Dec. 2015].

¹⁸ Tanenbaum, M. (2014). *Mass production Industry*. [online] Encyclopedia Britannica. Available at: <http://www.britannica.com/technology/mass-production> [Accessed 14 Apr. 2016].

been perceived as a mean of transportation. His commitment to lowering costs led to many technical and business innovations. The basic assembly line technique approach can be seen until today as a high percentage of the products is mass produced.¹⁹

Before the industrial revolution and one of its major technology developments – mass production, the goods produced were considered as “each piece was an original”.²⁰ The first significant change can be observed in architecture for which the Greek and Roman forms of architectural style were still iconic, at least until industrial revolution. It was considered fashionable due to well-known building principles taken over from various types of architectural designs. It was mainly the Greek designs what dominated the architectural appearances that were used until the 19th century.²¹

Thanks to those innovations in technology and manufacturing facilities, architecture became a popular way of design expression as it became easier to design new types of buildings. Overall, new architectural designs were linked to easier adaptation of architect's own style, mainly in the architectural appearance all over the world. The access to higher quality resources and more sophisticated techniques was a contribution for the design which became a significant aspect of many products. Consequently, during the industrial revolution, the textile industry has also boomed as fashion started to play very significant role among all social classes. Because of this development, the architects could incorporate and introduce new fabrics such as velvet and silk which were later widely used in interiors as they were different from all designs known before this era.²²

Regarding the facts mentioned above, the architecture is being considered as the turnover point in design approach due to frequent changes in innovations and used materials. Most importantly, all changes occurring in architecture influenced directly the design of consumer goods and other material products.

¹⁹ Ayers, E., Gould, L., Oshinsky, D. and Soderlund, J. (2011). *American passages: A History of the United States, Volume II: Since 1865*. Belmont CA [etc.]: Wadsworth, p.626.

²⁰ McFarren, J. (2015). Craft Revisited: Moving Toward a Consumer Revolution. *New York Folklore*, [online] 41(1551-7268), pp.28-37. Available at: http://search.proquest.com.zdroje.vse.cz/publication/publications_26490?accountid=17203 [Accessed 11 Apr. 2016].

²¹ Moffett, M., Fazio, M. and Wodehouse, L. (2008). *A World History of Architecture*. London: Laurence King Publishing, pp.413-414.

²² Tanenbaum, M. (2014). *Mass production Industry*. [online] Encyclopedia Britannica. Available at: <http://www.britannica.com/technology/mass-production> [Accessed 14 Apr. 2016].

1.1.4 The digital revolution in design

As the computers were developed and started to be used in everyday life, their features rapidly increased the productivity in engineering and consequently in designing and customization. In 2012, Ellen Lupton, a well-known American designer, said that *“traditionally production used to be a barrier for designers but now the computer, a tool for both design and production, has become the gateway.”*²³ Regarding the statement, this technological innovation mainly increased the speed of the design itself as well as its imagination in real practice.

Generally, hardware and software developed for engineering application are also known as CADD, or CAD (Computer Aided Design and Drafting). CAD’s features enable creation of three-dimensional models and even allow testing its functionality, being viewed and checked from any possible angle. CAD provides solid modeling in the virtual reality for machines that help in design activities. All of these aspects mutually increase the speed of development and reduce the research and development costs in comparison to traditional modeling in which one mistake forced the designer to start again. The most popular programs used are namely: Auto CAD, Real CAD Pro, Rhino3D, Iron CAD, and many others. In addition, new innovations in three-dimensional printers reduce the time spent on actual physical modeling and realistic imagination.²⁴

1.2 Factors influencing design

Designers primarily aim to create products that satisfy user’s needs and aspirations, and at the same time consider differentiation from the competition. The general perception of the design is related only to the visual aesthetics of a product but is not completely true. Nowadays, consumers purchase products not only because of their appearance and function but also because of their added symbolic value. The power of design is capable of creating those emotional and symbolic meanings in a consumer and building a long-

²³ Designhistory.org, (2016). *Screen Thinkers*. [online] Available at: http://www.designhistory.org/Digital_Revolution_pages/Impact.html [Accessed 5 Jan. 2016].

²⁴ Role of Computer and Automation in Design and Manufacturing for Mechanical and Textile Industries: CAD/CAM. (2013). *International Journal of Innovative Technology and Exploring Engineering*, [online] 3(3), pp.174-177.

term brand image. In its widest sense, design may lead to products that consumers wish to own and that evoke pride in ownership. Consequently, the design of a product can result in an important competitive advantage. However, the success cannot be achieved only by designer's work but the cooperation between designers and other departments, such as management, marketing, or research and development is necessary. The expertise of industrial designers can provide an important support for the team at most stages of product development, unless the design is integrated in this process.²⁵

The product design literature suggests that any development process of designing affects several factors which cannot be avoided. The following paragraphs were selected and categorized by research on Craft and Design²⁶ and Product Design and Manufacturing²⁷ which mainly consider the technology and function and marketing of similar variables.

The first condition, **relationship between functionality and appearance**, considering aesthetics and ergonomic, requires that the product must be able to do its given job. The next category is named as **conditions for choice of materials**, where the usage of the product, materials, and expected quantity are evaluated. Nevertheless, the evaluation of the ability to fulfill the purpose of the products' functionality is considered as the most crucial aspect.

After the first condition is fulfilled, the designers need to take the expected or desired **durability and obsolescence** of the final product into account. This condition is based on estimated product life-cycle, and for how long the final consumer desires to use a particular product. When developing the design and considering product's durability, several conditions, in which the product will be used such as pressure, area and other internal and external factors connected to usage, must be considered.

The next requirement, **ease of maintain**, very often overlooks the life expectancy. The general perception is that more expensive prime-market products are expected to have longer life. **Efficiency**, which is closely related to ease of maintenance, depends directly

²⁵ Goffin, K. & Micheli, P. (2010). Maximizing the Value of Industrial Design in New Product Development. *Research Technology Management*, vol. 53, no. 5, pp. 29-37

²⁶ Education Scotland, (2016). "Craft and Design" [online]
http://www.educationscotland.gov.uk/images/3730det2_tcm4-124439.pdf, [Accessed 7 Jan. 2016].

²⁷ Chitale, A. and Gupta, R. (2014). *Product Design and Manufacturing*. 6th ed. New Delhi: Prentice-Hall of India, pp.34-39.

on the quality of a particular product. For instance: cheap kettle will just boil the water but high quality kettle will do it faster with lower consumption of electricity. Customers nowadays do not tend to evaluate only the purchase price but consider **running costs** as well.

One of the most significant aspects, mainly from consumer's perspective, is **safety**. Even though consumers usually do not have the critique eye, many products have to fulfill standard regulations given by international organizations such as ISO (International Standards Organization) or national governmental laws. Moreover, designers have to take **environmental and social** issues into account as all products have some impact on the natural and social environment. Those aspects are categorized into three main areas:

- Environment – aesthetic perspective: visual impacts on its surroundings
- Environment – pollution created by the manufacturing process, its emissions produced during its lifecycle, and after the ending of usage
- Social – in which way the user and the society is influenced by the product

Next, constant **technology** development and large investments in R&D require usage and application of new technologies on the visual part of a product, especially with an emphasis on the incorporation of that particular innovation.

The most visible and the most crucial factor for designers is the category of **fashion and style**. This category's aim is to fit a product into current trends and styles or to suggest new trends – designer's own. The most important point is that all previously mentioned categories should be in harmony and the final step of the actual appearance has to be subordinated, although it is the first thing which usually impresses a consumer.

2 AUTOMOBILES AND ITS DESIGNS

2.1 Role of the automobiles for business and for customers

One of the main innovations coming from the industrial revolution is an automobile. Since the end of the 19th century, vehicles became an indispensable part of many businesses, transportation and a standard of living for people all around the world. Automobile industry affects many global developed economies by employing enormous amount of labor from several areas. A great example of the importance of an automobile industry is the fact that only in North America, the industry employs over 6 350 000 people.²⁸ Moreover, it belongs to major economy drivers with 11,5 % manufacturing contributions to the GDP.²⁹ Therefore, it has an enormous impact on the U.S. and the global economy.

Currently in highly competitive markets, design and technological developments play a very important role as their aim is to get customers' attention and twist it into purchase decision. According to the European Commission's research which evaluates factors influencing new vehicle purchase decision, the respondents recognized design, style, and performance as the second, third or fourth most significant factor when acquiring a new car. The winning decision factor of an automobile purchase was the purchase price, fuel consumption and safety.³⁰

Nowadays, the main function of an automobile is not just getting a passenger, or cargo, from point A to point B. The automobile market offers several types of passenger automobiles from small city vehicles to family or sport cars, and huge pickup trucks. Each of them has a different use and specifics. An automobile may serve as a tool representing some kind of status such as: a family car does not create the same

²⁸ U. S. Bureau of Labor Statistics. 2014. *Automotive Industry: Employment, Earnings, and Hours*. [online] Available at: <http://www.bls.gov/iag/tgs/iagauto.htm> [Accessed: 16 Mar 2016].

²⁹ Hill, K., Menk, D. and Cooper, A. 2010. *Contribution of the Automotive Industry to the Economies of all Fifty States and The United States*. 1st ed. [pdf] Ann Arbor: Center for Automotive Research,. Available at: <http://www.cargroup.org/?module=Publications&event=View&pubID=16> [Accessed 11 Apr. 2016].

³⁰ How Important is 'Vehicle Safety' in the New Vehicle Purchase Process?. (2005). 1st ed. [pdf] European Commission, pp.56-60. Available at: http://ec.europa.eu/transport/roadsafety_library/publications/sarac2_4.1.pdf [Accessed 11 Apr. 2016].

impression as a limousine or a sports car.³¹ It shows that passenger vehicles no longer fulfill only the mission of transporting but also represent a personal aspect of the owner, the social class, lifestyle, and in some point even a personality.

As expected and confirmed by the research, the income has the major impact on the purchase decision, mainly when buying a new car from a higher segment. Similarly, people with higher education tend to favor new cars from higher segments. Generally, consumers who are able to afford to purchase a new automobile are more willing to spend their money for them. However, even those people who may not be able to afford to purchase a new vehicle immediately but still wish to get one, are willing to try to make a use of credit in order to reduce the risk associated with buying a second hand car. Later, the research proved that with an increased age, consumers choose cars from higher segments. The research also showed that consumers generally prefer domestic car brands in case they have lower/middle income or if they want to buy a car from the segment of small automobiles. Nevertheless, when purchasing a vehicle from the premium level brands, the customers are less likely to favor only domestic brands.³²

2.2 Automobile's design and technology development over time

This subchapter evaluates automobile technological and design development over time by demonstrating this procedure in following countries: Europe (Germany, UK, France, and Italy), the U.S.A., and Japan. Russia, China, and the Czech Republic are not considered in this subchapter due to the communist political regime (during the observed period) in these countries which did not allow competitive development of the market.

Based on the research of the University of Colorado, the history of the automobile industry can be dated back to the late 17th to the mid-18th century. Germany and France can be considered a cradle of the automobile industry which was later on brought to the

³¹ Greenburg, Z. 2009. *What Your Car Says About You*. [online] Forbes. Available at: <http://www.forbes.com/2009/10/06/car-personality-wealth-lifestyle-vehicles-gender-income.html> [Accessed 20 Apr. 2016].

³² Prieto, M. and Caemmerer, B. (2013). An exploration of factors influencing car purchasing decisions. *Intl J of Retail & Distrib Mgt*, [online] 41(10), pp.738-758. Available at: <http://search.proquest.com.zdroje.vse.cz/docview/1432227131/fulltextPDF/EF1FC64BA6254FA0PQ/1?accountid=17203> [Accessed 4 May 2016].

U.S.A. in the era of mass production when engineers began with an invention of steam power, combustion, and electrical motors. At the beginning of its evolution, around 1900's, there were several trials which aimed to apply electric engines into the car. However, in those times, there were no such batteries existing which would have allowed a car to move "fast" and for a long distance. The steam-driven automobiles lasted into 1920's when combustion engines were invented and replaced steam engines.³³

The first person who constructed a reliable internal combustion engine automobile was Karl Friedrich Benz in Mannheim, Germany, in 1885. He strived to create a vehicle which would run entirely on its own power. His innovation was a three-wheeler, equipped with a single-cylinder four-stroke-cycle engine. Moreover, the vehicle included a differential gear and a water-cooled engine.³⁴ The above mentioned period is also known as **Invention era**. Before 1908, designers favored so called "Edwardian" architecture which used to be the preferred architectural style as it was based on simple shapes and functionality. These simple features were taken over by the automobile industry which resulted in construction of more affordable automobiles. This era is well-known for its high interest in the construction of an automobile, and thus many vehicle variants and observations were tried. In that time, automotive development was completely hardware based as in principle each car was built up as an individual item.³⁵

2.2.1 Pre-World War II period

The very short **Manufacturing era** lasted roughly between 1908 and 1914, till the beginning of World War I. Due to high prices of automobiles, most people could not afford to purchase them. But when Henry Ford, also called as the father of modern assembly lines, revolutionized the industry and started to assemble the first massively produced vehicle – Model T, the situation rapidly changed. The mass production made the automobile more affordable for ordinary people which basically fulfilled Ford's

³³ Colorado.edu. 2014. *The Impact of the Automobile on the 20th Century*. [online] [Accessed: 16 Mar 2016].

³⁴ Kirby, R. (1990). *Engineering in history*. New York: McGraw-Hill. p. 406-408

³⁵ Concheri, G., Meneghello, R. and Savio, G. (2011). Tracing the Evolution of Automobile design: Factors influencing the development of aesthetics in automobiles from 1885 to the present. In: *IMProVe 2011 - International Conference on Innovative Methods in Product Design. Proceedings: Full Papers Volume*. [online]. p. 8-12

dream of building a great car at lower costs and fair price. The Ford Company introduced Model T in October 1908 at the price of \$950. Therefore, 1908 was a significant year for automobile market as the majority of customers who purchased Ford's automobiles shifted from the hobbyist and enthusiasts to the average users. But Ford's focus on building a functional car with only one model at black paint and the same price, led into losing achieved "monopolistic" ground over time. Contradictory, thanks to that, General Motors (GM) and eventually Chrysler started to gain more and more popularity because they were the first automobile companies to offer such products which attracted those customers seeking better status and a sense of individuality. Ford's competitors met the demand for different, more comfortable, higher quality models, offering the promotion of higher social status and wealth. Soon after, the overall market started to grow very fast due to mechanical improvements of the products, lower prices as well as the application sales and payment plans.³⁶

Between 1920 and 1930, a decade known as **Capsule era** came to the fore, as the engineers and the stylists closed the body of the automobile. Furthermore, specialists who design an interior of a car realized the value and the logic of manipulation. That is why, opening and closing the space started to play a significant role in automobiles development. Moreover, the closed body emphasized by curved glass and a feeling of privacy had a great success among consumers.³⁷

Meanwhile on the old continent, after the 1st World War, German's economy was in poor conditions as a lot of automobile manufacturers were owned by the American ones, for instance Opel belonged to General Motors. Another negative hit for many economies, the Great Depression in the early 1930s, led Germany's automobile industry into another crisis. Out of many existing auto manufacturers in 1920's, only a few of them survived the depression and some of them have been able to keep their position on the market until today such as Daimler-Benz, Opel or Ford-Werke. In 1932, Wanderer and Audi formed a joint venture known as the Auto Union and this cooperation helped to lead the German's

³⁶ Mom, G. (2014). *Atlantic Automobism: Emergence and Persistence of the Car, 1895-1940*. New York: Berghahn Books, p.107.

³⁷ Concheri, G., Meneghello, R. and Savio, G. (2011). Tracing the Evolution of Automobile design: Factors influencing the development of aesthetics in automobiles from 1885 to the present. In: *IMProVe 2011 - International Conference on Innovative Methods in Product Design. Proceedings: Full Papers Volume*. [online]. p. 8-12

automobile industry out from the crisis.³⁸ Another reason behind the comeback of motor industry was the political change in the country when Nazi government came to power. Having introduced new laws and plans for national development, the standard of living in Germany increased. The main benefits for the automobile industry at that time were: huge investments in highways construction and Volkswagen's task, given by the Nazi government, to create and construct a reliable, robust, but inexpensive "people's car".³⁹

In the end of the manufacturing era, the **Classic era** began with the Great Depression in 1930 and ended around 1940 shortly before World War II. During this period of time, curved and more stylish features replaced rectangular and industrial shapes used in the past. These new automobiles were promoted and perceived as sleek and beautiful. Furthermore, the new technology innovations allowed designers to create luxurious aerodynamic cars with big curves and deep arches. All of this escalated in new salon/sedan body style for cruising with incorporated trunk for storage at the rear part of a car. In this era, automobile designers modeled their forms according to the pattern of airplanes and trains because these objects were seen as symbols for speed. However, several automakers used the airplane's semantic frame to assure that their vehicles would look fast even if, in fact, that was not necessarily true. Additionally, the size of the wheels, lights and fenders hugged the body, aiming to point off safety and strength of the frame. Therefore, tires were wider and thicker than in the Capsule era, which actually added to the solidity of the vehicles. The old open-top automobiles reminding phaetons, and touring cars dominated the era and at the end of the Classic era, wings, running boards, and headlights started to be more and more integrated into the body of the automobile. Those design changes of integrated fenders and fully closed bodies dominated the market before the World War II. Newly innovated and adopted technological features, during the 1930s, such as independent front suspension, manual, automatic transmissions, semi-automatic transmissions, or hydraulic brakes have become a standard for further models.⁴⁰

³⁸ Herrigel, G.. (2006). Review of *The Dynamics of German Industry: Germany's Path toward the New Economy and the American Challenge*. *The Business History Review*, 80(3), 612–615.

³⁹ Reich, S. (1990). *The Fruits of Fascism: Postwar Prosperity in Historical Perspective*. New York: Cornell University Press, p.162..

⁴⁰ Concheri, G., Meneghello, R. and Savio, G. (2011). Tracing the Evolution of Automobile design: Factors influencing the development of aesthetics in automobiles from 1885 to the present. In: *IMProVe*

Moving on, Germany, Italy and United Kingdom are considered as the core of the European automobile industry. Already back in 1930s, such companies as Daimler-Benz, BMW, Rolls-Royce, or Fiat were established. Before the Great Depression, American automobile industry counted a large number of manufactures but by the end of the 1930's, many of them went out of the market or bankrupt. Consequences of the Great Depression led to the strengthening of three major American automobile manufacturers' position, also known as "the Big Three" - General Motors, Ford, and Chrysler." Each of them had slightly different strategy. Ford wanted to stay affordable but GM's desired to produce automobiles serving as a symbol of high status and social class structure. Therefore, the company targeted clients which would be willing to spend a lot of money for luxury goods and services in order to display power or social status.⁴¹

Lastly, Japanese contribution to design and performance innovations in this period was minimal. Japanese companies started to construct their first automobiles later on, approximately from the middle of 1910s. First Japanese passenger vehicles used the style of European cars by licensing the European brands. One of the reasons for doing so was the high demand for domestic trucks because of Japanese military focus before World War II. Therefore many factories were modified for production of trucks, or military products.⁴²

2.2.2 Post-World War II period

After the end of World War II, so called **Integration era** had started. The beginning of the period significantly influenced the entrance of the U.S to the war as the automobile production decreased due to war military purposes. On the other hand, thanks to that, advanced engineering from the aviation industry created the improvements for postwar civilian cars. In comparison to pre-war vehicles, passenger vehicles' size enlarged as well as their engine and power. After the Great Depression and World War II, the U.S.

2011 - *International Conference on Innovative Methods in Product Design. Proceedings: Full Papers Volume*. [online] p. 8-12

⁴¹ Parry, G. and Graves, A. (2008). *Build to Order: The Road to the 5-Day Car*. London: Springer, pp.13-33.

⁴² Cromer, O. (2016). *Automobile - History of the Automobile*. [online] Encyclopedia Britannica. Available at: <http://www.britannica.com/technology/automobile/History-of-the-automobile> [Accessed 4 Jan. 2016].

produced more than 75 % of all automobiles in the world by 1950's.⁴³ This American success is related to a new production strategy of modern one-piece auto bodies which carmakers introduced in the United States in 1949. The main result of the Integration era was a combination of all parts of the car to make a one shell and ever since, automobile bodies have been in principle similar to the modern car bodies we know today. From the technological perspective, the designers started to highly implement and suggest styles considering and promoting safety.⁴⁴

Moreover, the space races between the United States and the Soviet Union contributed to large investments into space programs, and therefore jets and rockets influenced the appearance scheme as the space interest started to come on the scene. Rears “fins” were popular as well as front bumpers and taillights which had sometimes their shape taken from the rockets. Cadillac's 1959 Cyclone is a prime example of using design features of V2 missile and its application on cars. Further, mainly chrome plating and two-tone painting gained its popularity among audience and producers.⁴⁵

Due to economic and infrastructural damages which World War II caused, European politicians had to find a way to start or restart the engine of the economy – production. One of the key tools was the automobile industry. In order to protect domestic vehicle industry, most of the western European countries imposed taxes on motor fuel to limit its imports which led to increase of running costs for drivers. Reasonably, it resulted in a production of new automobiles with reduced size and engine performance. Due to their lower consumption (in comparison to their American competitors' products), these cars became more economical. The European automobile market was mainly dominated by German's, United Kingdom's, French and Italian brands.⁴⁶

⁴³ People.hofstra.edu. (2016). *Automobile Production, Selected Countries, 1950-2012*. [online] Available at: https://people.hofstra.edu/geotrans/eng/ch2en/conc2en/carprod_evolution.html [Accessed 15 Jan. 2016].

⁴⁴ Concheri, G., Meneghello, R. and Savio, G. (2011). Tracing the Evolution of Automobile design: Factors influencing the development of aesthetics in automobiles from 1885 to the present. In: *IMProVe 2011 - International Conference on Innovative Methods in Product Design. Proceedings: Full Papers Volume*. [online] p. 8-12

⁴⁵ Concheri, G., Meneghello, R. and Savio, G. (2011). Tracing the Evolution of Automobile design: Factors influencing the development of aesthetics in automobiles from 1885 to the present. In: *IMProVe 2011 - International Conference on Innovative Methods in Product Design. Proceedings: Full Papers Volume*. [online] p. 8-12

⁴⁶ Fauri, F. 2012, Surviving in the Global Market: 'Americanisation' and the Relaunch of Italy's Car Industry after the Second World War, *Contemporary European History*, vol. 21, no. 1, pp. 41-59.

In the late 1960's, "the Big Three" tried to market small cars in the United States, expecting to gain the same popularity as in Europe but the result was not successful. The reason behind this failure lies in the preferences of American consumers who preferred large sizes and powerful performance of automobiles. Therefore, these preferences became the prime focus of marketing in the U.S and the auto manufacturers launched pony cars and muscle cars such as the Ford Mustang and the Plymouth Barracuda on the market⁴⁷. Those vehicles had specific style and a longer, lower, and wider automobile structure.

Each of the two categories had its main symbolic model. Pony cars were represented by Ford Mustang, and a typical muscle car was Pontiac GTO. In these cars, large high-output engines with sporty look were combined, using the long hood, small rear deck and rear seat. Moreover, retractable hardtop was developed and installed in the cars which were very positively perceived by customers. The success and popularity of these vehicles led local competitors to orient themselves on these particular types of cars and later, several imitators showed up on the market.⁴⁸

While in overseas, it was the export that helped the European economies to recover during the 1950s. For instance, Volkswagen Beetle was the most imported car in the United States at that time. The general increase in income in Europe resulted in higher purchase power of the European population and the European automobile designers were given the opportunity to leave the past main focus on small cars and re-orient the skills on enlargement of the size, by the late 1960's. Furthermore, hatchbacks were designed and introduced already in this period but they did not become popular immediately as their success was yet to come. This particular type of a car became the most popular body style for smaller car categories by the mid-1980s.⁴⁹

During the 1960s, Japanese automakers started to play a significant role on the automobile market as they launched a high volume of new tiny automobiles, named as "*Kei cars*", on their domestic market. Thanks to the production of these very small

⁴⁷ Morris, D.Z. (2014), Cars with the Boom: Identity and Territory in American Postwar Automobile Sound, *Technology and Culture*, vol. 55, no. 2, pp. 326-353.

⁴⁸ Bailey, K. (2007). *Muscle cars*. New York: Crabtree Pub.

⁴⁹ Evans, R. (2015). *Volkswagen's Dark Past*. [online] History Net: Where History Comes Alive - World & US History Online. Available at: <http://www.historynet.com/volkswagens-dark-past.htm> [Accessed 6 Jan. 2016].

cars, an average Japanese inhabitant could afford to buy an automobile which enormously helped to boost sales and “kicked” the auto industry toward into what it became today. The “Keis” were very successful but the lack of space inside the car did not meet the desires of most Japanese families. On that account, by the end of the sixties, more powerful engines and larger chassis started to be implemented into the vehicles in order to fulfill the need of larger space.⁵⁰

2.2.3 Impact of the oil crisis

During the following design period, known as **Modern era**, the body styles have changed. The automobile designers have no longer only borrowed semantic meaning from planes and missiles, but rather they started to develop new style on their own. Designers were searching for inspiration mainly in natural shapes, and therefore the automobiles started to look more and more organic. In those times, three vehicle categories dominated the automobile market, and over time became so popular that these models could survive until today. These categories are known as hatchbacks, minivans, and sport utility vehicles. From the current point of view, all of them are relatively recent concepts and their popularity was accelerated by an active generation who loved to be on the road.⁵¹ It has to be mentioned that their popularity was not achieved only because of the revolution in technology and design but more likely due to economic impacts.⁵²

Nevertheless, one of the reasons for the change was the desire to differentiate and to propose new styles of vehicles, but the major impact on the development in the automobile industry had the oil crises. The first embargo in 1973-1974 issued by Arab members of the OPEC (Organization of Petroleum Exporting Countries) resulted in rapid

⁵⁰ Nunn, P. (2005). *Minicars: Cheap and Cheerful*. [online] News from Jama. Available at: <http://www.jama-english.jp/europe/news/2005/jan-feb/peternunn.html> [Accessed 7 Jan. 2016].

⁵¹ Concheri, G., Meneghello, R. and Savio, G. (2011). Tracing the Evolution of Automobile design: Factors influencing the development of aesthetics in automobiles from 1885 to the present. In: *IMProVe 2011 - International Conference on Innovative Methods in Product Design. Proceedings: Full Papers Volume*. [online] p. 8-12

⁵² Concheri, G., Meneghello, R. and Savio, G. (2011). Tracing the Evolution of Automobile design: Factors influencing the development of aesthetics in automobiles from 1885 to the present. In: *IMProVe 2011 - International Conference on Innovative Methods in Product Design. Proceedings: Full Papers Volume*. [online] p. 8-12

increase in oil prices.⁵³ Due to the crisis, the demand for large high-consumption cars significantly dropped and the automobile manufacturers were determined to find new ways to attract potential customers. This change in society led to huge shifts in the automobile industry, and the producers realized that the topic of fuel economy plays a very significant role for the purchase decision. As one study observed, the customers had to make trade-offs between weight, power, torque, environmental impact and fuel economy, and consumption. And fuel consumption got an enormous attention by customers when they were purchasing a new car.⁵⁴

The oil crisis positively affected Japanese importers on the American market, primarily Toyota, Honda, and Nissan which assembled less powerful engines into their cars with lower fuel consumption than the typical American engines. Because of the embargo and American government permission for foreign automobile manufacturers to import cars to the U.S, the previous popularity of large, heavy, and powerful automobiles decreased. Due to domestic inability to offer subsidiary product, the small fuel-efficient cars from importers' producers took higher proportion on the U.S. automobile market.⁵⁵ The exports of passenger cars had a huge positive impact on Japanese automobile industry which started to grow in a fast pace. On the other hand, thanks to the increased competition on the U.S market, the "Big Three" was forced to focus on development of its own smaller and less-consuming models. Regarding the pressure, the MUV was introduced and promptly became very popular for its possibility of fitting up to seven people inside the car as well as for the possibility to carry large loads.⁵⁶

The very similar impacts can be found on the old continent, when the oil crisis turned European's buying behavior away from larger and high-consumption automobiles as it happened in the United States. One of the most notable impacts of the situation was increasing popularity of hatchbacks. Although Japanese manufactures exported hatchbacks to the U.S, the European auto producers were able to construct them

⁵³History.state.gov, (2013). *Oil Embargo, 1973–1974 - 1969–1976 - Milestones - Office of the Historian*. [online] Available at: <https://history.state.gov/milestones/1969-1976/oil-embargo> [Accessed 4 Jan. 2016].

⁵⁴ Knittel, C. (2011). Automobiles on Steroids: Product Attribute Trade-Offs and Technological Progress in the Automobile Sector. *American Economic Review*, 101(7), pp.3368-3399.

⁵⁵ Lee, S.M. 2011, "A Comparative Study of the Automobile Industry in Japan and Korea", *Asian Survey*, vol. 51, no. 5, pp. 876-898.

⁵⁶ Gomez-Ibanez, Jose A., and David Harrison. (1982), *Imports and the Future of the U.S. Automobile Industry*". *The American Economic Review* 72 (2). American Economic Association, pp. 319–323.

themselves, thus allowing another boom for the European market. In addition, the most significant change in performance was the transition from rear-wheel drive, particularly on family cars, on to front-wheel drive. After the oil crisis, European markets were mainly dominated by the small passenger cars.⁵⁷

Despite of the crises, this decade introduced several technological innovations such as electronic engine control units, fuel injection, disc brakes, or application of turbo chargers, which allowed having higher power performance with the same or lower fuel consumption. Moreover, front-wheel drive became the facto standard.⁵⁸

2.2.4 Current situation

Since the **Modern era**, which began in late 60's, no new designer era was defined, and therefore the modern era continues somehow until present day. However, designers today have more challenges regarding consumer's aspirations because they take not only the functionality of the product into account but also consumer's emotional reactions to the automobiles. Designers are well aware of how to create the feeling of speed but it is not the only decision making factor the consumers are looking for. Current modern design theory is looking at the bigger picture related to car design for individuals. Auto designers today use all parts of the car to express a personalized semantic frame for individual lifestyles. Speed is not the only feeling designers are trying to convey in their automobiles due to the fact that the awareness of the environmental factors is getting more and more importance and the automobiles tend to reflect a gentler lifestyle and aesthetic.⁵⁹

Nowadays, the semantic frame of the car is changing once again because of high appreciation of safety. Moreover, marketers and designers have recognized the potential that customers value the appearance of a vehicle, and therefore it is crucial that each part

⁵⁷ Treece, J. (2013). *10 ways the 1973 oil embargo changed the industry*. [online] Automotive News. Available at: <http://www.autonews.com/article/20131014/GLOBAL/131019959/10-ways-the-1973-oil-embargo-changed-the-industry> [Accessed 6 Jan. 2016].

⁵⁸ Cortez, M.A.A. & Cudia, C.P. (2010), The Impact of Environmental Innovations on Financial Performance: The Case Of Japanese Automotive and Electronics COMPANIES", *Journal of International Business Research*, vol. 9, pp. 33-46.

⁵⁹ Raizman, D. (2004). *Hisotry of Modern Design: Graphics and Products since the Industrial Revolution*. London: Laurence King Publishing., p. 375

of an automobile is good looking. With the innovation of media, sound, navigation system, and entertainment gadgets, stylists are obligated to incorporate them in the vehicle.⁶⁰

To point out, the global economic environment plays a significant role in the automobile industry. Financial crisis, which started in 2007, slowed down world economic development and auto manufacturing has been one of the most affected industries. As a result, General Motors and Chrysler went bankrupt and had to be saved by the American government. Nevertheless, according to Autodata Corporation, in June 2014, the seasonally adjusted annualized sales were the biggest in history, with 16,98 million vehicles, and overcame previous record from July 2006.⁶¹

Nowadays, the German automobile industry is regarded as the most competitive and innovative in the world. Currently, five German automobile manufacturers lead the industry in the domestic region: Volkswagen AG (and its subsidiaries Audi and Porsche), BMW AG, Daimler AG, Adam Opel AG and Ford-Werke GmbH.⁶²

The automotive industry in the UK remained famous mainly for premium and sports cars and its brands such as Aston Martin, Bentley, Jaguar, Land Rover, Lotus, McLaren, MG, Mini, and Rolls-Royce. Overall, many British auto manufacturers have been acquired by foreign ones. For example: Bentley belongs to Volkswagen Group, MG is owned by SAIC, BMW bought Mini and Rolls-Royce, TATA owns Jaguar and Land Rover, and FORD merged with Aston Martin.

Considering France, there are two major auto making companies PSA (Peugeot and Citroën) and Renault including its sub-brand Dacia. Italian automotive industry should not be forgotten as it is well-known for its orientation on automobile design and more

⁶⁰ Concheri, G., Meneghello, R. and Savio, G. (2011). Tracing the Evolution of Automobile design: Factors influencing the development of aesthetics in automobiles from 1885 to the present. In: *IMProVe 2011 - International Conference on Innovative Methods in Product Design. Proceedings: Full Papers Volume*. [online] p. 8-12

⁶¹ Woodall, B. and Lienert, P. (2014). *U.S. June auto sales hit level not seen since July 2006*. [online] Reuters. Available at: <http://www.reuters.com/article/us-autos-sales-june-idUSKBN0F646K20140701> [Accessed 3 Jan. 2016].

⁶² Gtai.de, (2016). *Germany Trade & Invest - Automotive Industry*. [online] Available at: <http://www.gtai.de/GTAI/Navigation/EN/Invest/Industries/Mobility/automotive.html> [Accessed 5 Jan. 2016].

specifically on small city cars, sports and supercars. Italian car production is completely dominated by Fiat Group which owns the upmarket Alfa Romeo and Lancia brands, and the exotic supercar auto manufacturers Ferrari and Maserati.⁶³

Lastly, the Japanese automobile production and sales have turned into one of the largest in the world and nowadays, it focuses mainly on technological development. Japanese automotive manufacturers include Daihatsu, Isuzu, Mazda, Mitsubishi, Subaru, Suzuki, and mainly Toyota, Honda and Nissan.

2.3 Types of passenger vehicles and its main components

There are several types of passenger vehicles on the market, mainly different in shape, size, length, and performance. Usually, those automobiles are categorized according to usage and shape of the vehicle into several groups. Even though, the differences in the body shape among the categories look at the first sight significantly different, all of them have the main vehicle components in common. It is crucial to introduce those categories and components because of their huge impact on the performance. Moreover, the components are always getting attention in terms of innovation and development. Most of the components can offer various settings. Customizing companies primarily modify one or all of the mentioned vehicle parts in order to achieve the desired goal of improving the design and the performance of the automobile.

Since 1960s, there is a significant increase in the number of model variants, and an eminent decrease of development time. For example, in the decade between 1960 and 1970, only three main model variant categories: sedan, sports car, and spyder, were founded as the development time was usually about six years in this decade. However, since that period, the competition and increased demand resulted in faster development. In addition, since 2000's, there are more than fifteen established passenger vehicle types' categories, and the development time has dropped from the original six years to approximately two to two and half years.⁶⁴

⁶³ Dell'Era, C., Marchesi, A. & Verganti, R. (2010), Mastering Technologies in Design-Driven Innovation, *Research Technology Management*, vol. 53, no. 2, pp. 12-23.

⁶⁴ Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated Computer-Aided Design in Automotive Development*. Berlin: Springer, p.3.

The following table summarizes the main model variants offered on the market. The table is categorized from the perspective of fundamental style, function, design, and customers' perception.

Table 1: Categories and types of vehicles

	Types of vehicle
Economy	Micro car, hatchbacks
Family	Small, large
Saloons/Sedans	Large family/mid-size; full size/large; Crossover SUV; Minivans
Luxury	Compact executive, mid-luxury, full-size luxury, grand saloon, station wagons
Sport	Hot hatch, sports saloon, sports car, grand tourer, supercar, muscle car, pony car, convertible
Off-roaders	Off-road vehicle
Commercial	Van

Source: Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated Computer-Aided Design in Automotive Development* p. 3

The basic concept of building an automobile involves fitting together separate individual parts and connect these into one frame, also called **chassis**. Starting with the description from the outside, the first part is the **body shell** which forms the skeleton of a vehicle and its actual look due to its shape and style. For that reasons, this is the key element for the exterior designers where they use their skills on actual appearance of an automobile. Then, the power unit of an automobile, the **engine**, transforms a particular fuel, for instance: petrol, diesel, LPG, electric, hybrid or hydrogen, into the energy that will later set the vehicle in motion. Directly dependent on the drive unit is the **exhaust system** which serves as the exhalation of the smoke from the used fuel out of the engine – but not in case of electro mobiles. Additionally, other power adding features such as turbo charger can be installed into the exhaust unit system. The generated power has to be somehow transmitted to the movement and the system that allows the transfer of energy from the engine to the wheels is called **transmission**. This part consists of four main components: clutch, gearbox, final drive, and differential. The drivers can recognize the result while driving and using one of the three main shifting methods: automatic, manual (including the physical pedal for clutch) or semi-automatic shifting. The actual fitting between wheels and body/chassis is secured by the **suspension** system. Furthermore, the

suspension system absorbs the road shocks, and secures the stability of a vehicle on the road. The shock absorbing hardware directly relates to **steering** system which allows manipulation of a vehicle by using the steering wheel in the cockpit, which turns the wheels in the desired direction. Nevertheless, the suspension, **tires and wheels** provide the stability and control of the traction of a car. Moreover, the breaks are closely related to wheels and tires as they enable the driver to slow down or stop the vehicle. Lastly, the **electrical equipment** may be divided into two main categories: as the driving affecting, and entertainment or information providing tools.⁶⁵

2.4 Styling development cycle

Automobile designers divide their work into several, more specific, tasks such as: exterior, interior and trim design. Another aspect which cannot be omitted, graphical design is also an important aspect of the automotive design. All the specialists have to find a way to fit all of their impacts together.

The truth is that designing is a complex process as the people responsible for the car appearance have to keep the technological and functional aspects in mind. These aspects include aerodynamics, platform, production, safety legality and many other issues. The ultimate task of a team is to co-operate with each other in order to achieve the best design, with the best performance, at given costs, for further production. Before the actual style development, the general requirements and their development challenges have to be evaluated in order to discover the first limitations for styling.⁶⁶

The following table shows what the actual general external requirements are and why they influence the new automobile development.

⁶⁵ Denton, T. (2011). *Automobile Mechanical and Electrical systems*. Kidlington, Oxford: Butterworth-Heinemann.

⁶⁶ Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated computer-aided design in automotive development*. Berlin: Springer, p.11

Table 2: Boundary conditions for the development of new cars

General requirements	Development challenges
Environmental impact of individual traffic	
Air pollution and noise Increasing traffic densities Expansion of road networks	Continuously stringent exhaust emission regulations Customer environmental awareness Alternative propulsion technologies New energy providing and storage concepts New vehicle concepts
Availability of the crude oil resources	
Rising fuel and production costs	Worldwide increase of individual mobility Increasing driving and transportation quantities
Traffic safety	
Vehicle and pedestrian accident	Materials and processes using renewable resources
Customer demands	
Comfort and surplus value functionalities Fashion and lifestyle	Increasing demands on active and passive vehicle safety Driving assistance systems Comfort functionalities

Source: Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated computer aided design in automotive development*. Berlin: Springer, p.11

2.4.1 The definition phase

First of all, a development team decides, or is given, the product strategy, the product characteristics, and the type of a vehicle that needs to be invented and designed. At first, the definition phase's focus is mainly oriented on exterior; and subsequently interior, and surfaces. This stage of the cycle is also called layout or pre-concept development phase, including the research of the design trends and market opportunities. From the stylish and design perspective, it is seeking originality and differentiation among its competitors. Furthermore, the product characteristics are settled down in a list of requirements which serves as a start-up schedule for the concept phase^{67, 68}

⁶⁷ Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated computer-aided design in automotive development*. Berlin: Springer, p. 14

2.4.2 The concept phase

After evaluation of the previous development stage, the concept phase includes a detailed description of the vehicle layout itself, focusing on a rough approximation in terms of styling, packaging and functionalities. All those results provide an overview of the principal vehicle setup. The key issue of the concept phase is the execution of the styling process within several boundaries categorized as packaging layout, styling concept, functionality, innovative technologies, and feasibility. The task of the stylists is to find optimal solutions that meet the requirements of technical, economic, market and fashion trends. Moreover, typical brand characteristics have to be already considered and enhanced.⁶⁹

Styling concept forms the crucial layout in the entire development process of the model. The designers apply observed information from the information which have a significant impact on customer's perceptions, and thus on the purchase decision. Specialists use mainly three main procedures when modeling a concept: sketching, clay modeling, and computer-aided styling software (CAS).⁷⁰

Further, **packaging layout** investigation considers space for passengers and luggage. This parallel procedure to the general vehicle architecture development shows how the car body structure can be finally defined and optimized. Within the layout execution, the "assembling" of the components and modules of a car are done, and it finds as perfect as possible modules placement such as drivetrain, tank, climate control, suspension and others. Feasibility investigation of the vehicle concept is very closely related to the packaging layout design as this activity observes and defines different styling proposals that may be applied within the vehicle packaging.⁷¹

⁶⁸ Hirz, M., Stadler, S., Prenner, M. and Mayr, J. (2012). Aerodynamic Investigations in Conceptual Vehicle Development Supported by Integrated Design and Simulation Methods. *Proceedings of the FISITA 2012 World Automotive*, Volume 7, pp.785-790.

⁶⁹ Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated computer-aided design in automotive development*. Berlin: Springer, pp. 14-16

⁷⁰ Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated computer-aided design in automotive development*. Berlin: Springer, p.12

⁷¹ Hirz, M., Stadler, S., Prenner, M. and Mayr, J. (2012). Aerodynamic Investigations in Conceptual Vehicle Development Supported by Integrated Design and Simulation Methods. *Proceedings of the FISITA 2012 World Automotive*, Volume 7, pp. 788-789

Already in this early stage of development, **functionality** is emphasized as an important task of the integration with a consideration of the full-vehicle scheme related to driving performance and fuel consumption. Very often, this development limits **production requirements** of the given types of engines and other included systems. Overall, it examines the technical interaction of the components and modules, and also verifies ergonomics functionalities. Most of the auto manufacturers want to install the newest **innovative technologies** in order to gain the competitive advantage. Therefore, it needs to be considered in this early stage. The implementation of new developments, for example electrical drive, hybrid, new transmission system, or interior and dashboard gadgets, have to be evaluated and take in to account since the early sketches, due to its shapes and features. This particular part of this phase gains even higher importance if there are new models or variants of model suggested.⁷²

2.4.3 The pre-development cycle

After finishing the concept stage, the pre-development phase includes a detailed definition of the vehicle layout and takes all ergonomic and legislative boundary conditions into account. In addition to the technical-related characteristics from the previous cycle, the comprehensive product decisions are made. Generally, it continues in concept phase procedures but within already observed borders. The product decisions are more likely to be focused on details and functionality maximization. The designers are obligated to evaluate following influential aspects:

The driver mainly sees the **ergonomics** which is a factor that aims to design equipment that achieves the best possible fit between the user and the automobile. Stylists take the passenger safety (by reducing the possibility for a user to get harmed or injured), comfort and convenience, performance, and efficiency into account. Moreover, in the massively produced automobiles, the ergonomic design is settled to the concept of “designing for the most”. In other words, to assure that most users within the intended population of the users of the product can fit within the product.⁷³

⁷² Hirz, M., Stadler, S., Prenner, M. and Mayr, J. (2012). Aerodynamic Investigations in Conceptual Vehicle Development Supported by Integrated Design and Simulation Methods. *Proceedings of the FISITA 2012 World Automotive*, Volume 7, pp. 788-789

⁷³ Bhise, V. (2011). *Ergonomics in the Automotive Design Process*. Boca Raton, FL: CRC Press. p.4

Safety and legislative requirements are necessary to be incorporated in this development level. This category focuses on emission level, the homologation of parts attached within the vehicle, and fulfilling further required crash tests and scenarios. **Geometrical integration** describes a detailed definition of packaging layout in order to perfectly fit into designed or given frame. Furthermore, other geometrically based boundaries need to be taken into consideration, whereby the knowledge from previous models may be used. In addition to the geometrical integration, the **specific characteristics** such as the typical seating position, the drivetrain configuration, suspension component and brand specifics are incorporated. At the end, **body structure** is optimized in order to precise crash scenarios, stiffness, maximum stress, and durability. All of these steps lead to a full-vehicle concept based on approved styling and engineering. The parallel process of **functional integration** verifies the technical functionalities and interaction of all components and units considering body structure, chassis, and drive train. Some of these modules and components are developed separately because of their usage in different car models.⁷⁴ Excluded from the technical features, designers have to co-operate with the department of **aerodynamics** as it has a great impact on car design and its shapes which are affected by the aerodynamics' conditions.⁷⁵

2.4.4 Series development

The fourth stage, called the series development, includes mainly the entire concept process, production-related and engineering viewpoints. All of the engineering procedures and conditions are affected by manufacturing-related boundary conditions, also called **production requirements**. Thus, both the virtual and physical developments cooperate with production engineering departments as well as with **supplier's coordination and integration** by searching for suppliers and parts and how to integrate them into the vehicle. During this phase, several concurrently developed components and modules are implemented into the full-vehicle architecture. Thereby, engine and drivetrain modules, brakes, suspension and electronic systems are included in the vehicle

⁷⁴ Hirz, M., Dietrich, W., Gferrer, A. and Lang, J. (2013). *Integrated computer-aided design in automotive development*. Berlin: Springer, pp. 16-18

⁷⁵ Hirz, M., Stadler, S., Prenner, M. and Mayr, J. (2012). Aerodynamic Investigations in Conceptual Vehicle Development Supported by Integrated Design and Simulation Methods. *Proceedings of the FISITA 2012 World Automotive*, Volume 7, pp. 793-794

setup. One example of the integration of developed modules is the engine unit. The implementation of internal combustion engines is a complex challenge and it has to take not only **engineering requirements** into consideration, but also **customer's and legislative demands**. Consequently, a reduction of fuel consumption, exhaust emissions, and increasing performance requirements need to be considered.⁷⁶

Component design focuses on choosing the adequate parts and proper materials. Those tools are designed and calculated in-house at the manufacturer as well as in cooperation with suppliers. This requires **virtual and hardware optimization and verification** including physical testing of fitting, the engine and drivetrain modules, brakes suspension and electronic systems which are part of the full-vehicle architecture setup. The component design results in building prototypes, testing aerodynamics and many other already mentioned components.⁷⁷

In this moment, the styling process should end and the vehicle is complete from the technical, production-related and of course aesthetics point of view. Now, the production process development and actual manufacturing process may start to be prepared.

2.4.5 Pre-series and series production

Lastly, before the final series production of a new car model, the **pre-series production** procedure is emphasized. During the pre-series production, the tooling and assembly procedures are tested and evaluated. From this stage, manufacturing process is performed, the targeted production volume is achieved and is followed by continuous quality check. After the acceptance of the tests and the verification of the production, the **series production**, the final product homologation is launched. After all, the final product requires constant quality control, and product and process improvement which is a never ending processes.⁷⁸

⁷⁶ Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated computer-aided design in automotive development*. Berlin: Springer, p.19

⁷⁷ Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated computer-aided design in automotive development*. Berlin: Springer, p.20

⁷⁸ Hirz, M., Dietrich, W., Gfrerrer, A. and Lang, J. (2013). *Integrated computer-aided design in automotive development*. Berlin: Springer, p. 20-21

3 AFTER MARKET CUSTOMIZATION IN AUTOMOBILE INDUSTRY

As the purpose of the thesis states, the ultimate goal is to evaluate the opportunities of automobile aftermarket customization on the Czech market. Due to the fact that many aftermarket modifiers come from or operate in Germany, German market was selected as a model for the analysis and the research. Even though those two markets are different in many aspects, for instance in purchasing power of population, or number of automobile manufacturers, but when it comes to passenger vehicle market, many similarities can be found. Firstly, in both countries, the automobile production plays a significant role for the economy itself. Generally, cars represent social status and income class of the inhabitants within these societies. Moreover, Germans are known for their passion for automobile races such as for Formula 1, DTM, WRC and many others. Among the Czech population, the interest mainly in rally racing, and motorcycle races can be observed.

In order to find and understand the potential of the market, in-depth interviews with representatives of Brabus, Startech, and Hamann were conducted. Moreover, representatives of BMW, Alpina and Mercedes-Benz in the Czech Republic were interviewed for the purpose of clarification of Czech customization market characteristics. Furthermore, for broader observations of current trends in design and performance, the 86th Geneva International Motor Show was visited by the author.

3.1 Comparison of German and Czech market

In all 28 European Union member states, there were about 13,71 million newly registered automobiles in 2015.⁷⁹ But what is even more interesting is that 23,4 % (around 3,21 million) of vehicles were registered in Germany.⁸⁰ German automobile sector is very well-known for its high production which the industry is able to generate. Moreover, cars are the source of personal recognition as the inhabitants are highly aware of what type of

⁷⁹ Statista. (2016). *Largest automobile markets worldwide - new car registrations | 2016*. [online] Available at: <http://www.statista.com/statistics/269872/largest-automobile-markets-worldwide-based-on-new-car-registrations/> [Accessed 17 Jun. 2016].

⁸⁰ Bekker, H. (2016). *2015 (Full Year) Germany: Best-Selling Car Brands*. [online] Car Sales Statistics. Available at: <http://www.best-selling-cars.com/germany/2015-full-year-germany-best-selling-car-brands/> [Accessed 17 Jun. 2016].

brand they purchase. Subsequently, the automobile owners appreciate the location of the production within their own market. Therefore, there can be seen more BMWs in Bavaria than for example in Stuttgart where the Mercedes-Benz comes from. One similarity between the Czech and the German markets can be noticed in the volume of ŠKODA cars registrations as ŠKODA cars are manufactured in the Czech Republic.

Having taken a deep look into the statistical reports, it is obvious that the German market leader Volkswagen brand (concern vehicles, such as ŠKODA, SEAT etc. are excluded), is number one automobile manufacturer with the largest volume of sales. In 2015, there were over 685 thousand of new Volkswagen registrations achieving in total 21,4 % of newly registered cars in Germany. With a significant gap, the top three German premium car brands behind the leader are represented by Mercedes-Benz with almost 290 thousand of registrations (8,9 % of total registrations), followed by Audi with approximately 270 thousand of new registrations (8,4 %), and BMW with little bit less than 250 thousand (7,8 %). Moving lower in the scale, the fifth and the sixth place is represented by Opel and Ford. The symbol of the Czech Republic's automobile production, ŠKODA, reached the seventh position with approximately 180 thousand of its cars registered in Germany (5,6 %). The data show that German customers mostly purchase German automobiles from all car segments (lower, middle, and premium segments).⁸¹

In comparison to German market, the distribution of new registrations in the Czech Republic is much different in both type of a brand and in a segment of vehicles. In 2015, a new record of about 231 thousand registered cars was achieved within the country. Almost one third of new registrations were represented by ŠKODA automobiles (32 %) followed with huge gap by Volkswagen (10,3 %) and Hyundai (8,5 %). Other automobile producers such as Ford, Dacia, and Opel followed the top three players with lower proportions. German premium brands, BMW, Audi, and Mercedes reached 11th, 13th and 15th place with proportion of 2,1 % – 2,55 %.⁸² One of the most probable reasons for

⁸¹ Bekker, H. (2016). *2015 (Full Year) Germany: Best-Selling Car Brands*. [online] Car Sales Statistics. Available at: <http://www.best-selling-cars.com/germany/2015-full-year-germany-best-selling-car-brands/> [Accessed 17 Jun. 2016].

⁸² Prokopec, P. (2016). *Nejprodávější auta v ČR v roce 2015: 100 modelů, 94 značek*. [online] Autoforum.cz. Available at: <http://www.autoforum.cz/zajimavosti/nejprodavanejsi-auta-v-cr-v-roce-2015-100-modelu-94-znacek/> [Accessed 28 May 2016].

such difference in the volume of premium brands' sales is the difference in economic development of those two countries and purchase power of their inhabitants.⁸³

Because of lower average income in the Czech Republic, it is expected that the customization of premium brands would not be as widespread as in Germany. It would be reasonable for tuning companies in the Czech Republic to focus on other than premium car segments as the percentage of customers who buy premium automobiles is significantly lower than in Germany.

Nevertheless, the statistical data mentioned above do not clearly show which registration is truly the first one. This issue stems from the common statistical practice that used cars imported from abroad to the Czech Republic are registered as brand new. It means that such a car was already registered somewhere in abroad for the first time (for example in Germany) and logically, the registration in the Czech Republic should be recorded as the second one which does not occur. Such biased recording system has a negative impact on Czech annual results in this field as there is a high volume of imported used cars in the Czech Republic. Not to be mistaken, this practice is common also in Germany.⁸⁴

3.1.1 Size of the customization markets

Almost every large car manufacturing company owns some exclusive modification company. Those modifiers are actually part of the original producer. There are two main reasons behind this strategy: the first one is the technological innovation and the second one is the aim to attract more customers by offering them larger and more detailed product portfolio.

For instance, since its establishment, Mercedes-Benz has had many exclusive modification brands to customize its vehicles, among which AMG is probably the most famous. The company was founded in 1967 and ever since, AMG modified models for racings. In 1993, AMG was formally acquired by Mercedes and became an exclusive

⁸³ Indexmundi.com. (2016). *Germany vs. Czech Republic - Country Comparison*. [online] Available at: <http://www.indexmundi.com/factbook/compare/germany.czech-republic> [Accessed 10 Jul. 2016].

⁸⁴ Prokopec, P. (2016). *Nejprodávější auta v ČR v roce 2015: 100 modelů, 94 značek*. [online] Autoforum.cz. Available at: <http://www.autoforum.cz/zajimavosti/nejprodavanejsi-auta-v-cr-v-roce-2015-100-modelu-94-znacek/> [Accessed 28 May 2016].

modification brand. Thanks to the manufacturer maintenance, AMG is able to reach the customers through Mercedes-Benz distribution network.⁸⁵ Besides AMG, Mercedes also establishes in-depth cooperation with some other modifying companies such as Brabus.

In 2013, Mercedes globally sold around 32,2 thousand (equals to 2,2 % out of 1,467 million vehicles sold that year) of AMG versions. Almost one fifth, 280 thousand, of total sales of Mercedes' cars was distributed in Germany.⁸⁶ Using simple mathematics, over 6 thousand AMG versions of Mercedes' automobiles were distributed in Germany.⁸⁷ Additionally, the total number of newly registered Mercedes' cars in the Czech Republic in 2015 reached 4 822 passenger vehicles.⁸⁸ If the same proportion of AMG modifications would be considered, there should be around 100 AMG versions of Mercedes-Benz automobiles distributed on the Czech market in a period of one year ($4\,822 \times 2,2\% = 106$). However, according to the interview with a specialist on AMG sales in the Czech Republic, the total amount of 134 AMG models was sold on the Czech market in 2015.⁸⁹ In this case, the real number turned out to be above estimated average which is rather surprising and it proves that the demand for modified cars in the Czech Republic is higher than expected.

Moreover, the exclusive Mercedes-Benz customizer, Brabus, claims to modify 7 500 vehicles annually.⁹⁰ Even though this number equals to only 0,5 % of the total Mercedes' sales ($7\,500 / 1\,467\,000 = 0,005$), the potential demand for modified cars of one single customizer in Germany is estimated around 1 400 Mercedes' vehicles a year ($280\,000 \times 0,5\% = 1\,400$). Applying this percentage on the Czech market, the amount of Mercedes' automobiles customized by the Brabus company would be about 24 cars per year ($4\,822 \times 0,005 = 24$)

⁸⁵ Mercedes-amg.com. (2016). *The AMG Story*. [online] Available at: http://www.mercedes-amg.com/about_story2.php?lang=eng [Accessed 17 May 2016].

⁸⁶ Ar2013.daimler.com. (2014). *Mercedes-Benz Cars | Daimler > Annual Report 2013*. [online] Available at: <http://ar2013.daimler.com/divisions/mercedes-benz-cars> [Accessed 8 Jun. 2016].

⁸⁷ Kable, G. (2014). *Mercedes-Benz announces record sales for its AMG division*. [online] Autoweek. Available at: <http://autoweek.com/article/car-news/mercedes-benz-announces-record-sales-its-amg-division> [Accessed 21 Jul. 2016].

⁸⁸ Prokopec, P. (2016). *Nejprodávanejší auta v ČR v roce 2015: 100 modelů, 94 značek*. [online] Autoforum.cz. Available at: <http://www.autoforum.cz/zajimavosti/nejprodavanejsi-auta-v-cr-v-roce-2015-100-modelu-94-znacek/> [Accessed 28 May 2016].

⁸⁹ Polanský, O. (2016). *Interview - New automobile sales and AMG expert*, Mercedes-Benz Praha.

⁹⁰ Brabus.com. (2016). *The Unbeatable Brabus*. [online] Available at: <http://www.brabus.com/en/deliver.php?id=12396> [Accessed 12 Jun. 2016].

Moving on to another premium brand, BMW prides itself on exclusive modification product series called M-Power. Founded in 1972, BMW Motorsport originally focused on auto races in which the M letter logo became the symbol of high performance of BMW automobiles. Nowadays, BMW uses this sub-brand for recognition of the customized version of the normal model. For example, M3, M5 and M6 are well-known for being masterpieces in this category.⁹¹

In 2015, BMW sold around 62,3 thousand of M customized automobiles out of 1 905 234 cars sold worldwide. In this year, BMW distributed 241 thousand (12,7 % of total BMW sales) vehicles to the German market.^{92,93} If the global proportion of M models' distribution is calculated, approximately 3.2 % of BMW cars are M versions. The estimated size of the German market was calculated using the same method as in case of Mercedes-Benz mentioned above. The estimated number of M modified vehicles distributed to Germany should be around 8 thousand vehicles in 2015. To point out, the amount of new registrations of BMW in the Czech Republic was 5 885 vehicles in 2015. That is why the predicted volume of M performance automobiles is supposed to result in about 185 vehicles of BMW M versions ($5\,885 \times 3,2\% = 188$) in the Czech Republic.⁹⁴ In addition, the official and exclusive BMW customizer in the Czech Republic is Alpina Company which annually sells between 12 to 15 cars.⁹⁵ The scale proportion of Alpina sales equals to the range of 0,2 % to 0,25 % of BMW automobiles sales on the Czech market ($12 : 5\,885 = 0,002$; $15 : 5\,885 = 0,0025$). If this ratio is applied on the German market, it is estimated that around 540 Alpina modifications could be distributed in Germany ($241\,000 \times 0,00225 = 542$)

Audi does not lag behind as a four-wheel drive and turbocharging seem to be its vehicles manufacturing standard. Quattro GmbH, an official customizer of Audi vehicles, was

⁹¹ Schompbmw.com. (2016). *The History of the M Series from BMW*. [online] Available at: <http://www.schompbmw.com/bmw-m-history.htm> [Accessed 17 May 2016].

⁹² BMW Group Annual Report 2015. (2016). 1st ed. [pdf] p.3 Available at: https://www.bmwgroup.com/content/dam/bmw-group-websites/bmwgroup_com/ir/downloads/en/2016/Annual_Report_2015.pdf [Accessed 4 Jun. 2016].

⁹³ BMW Group Investor Presentation. (2016). 1st ed. [pdf] p.33. Available at: https://www.bmwgroup.com/content/dam/bmw-group-websites/bmwgroup_com/ir/downloads/en/2015/Investor_Presentation_March_2016.pdf [Accessed 6 Jun. 2016].

⁹⁴ Prokopec, P. (2016). *Nejprodávanejší auta v ČR v roce 2015: 100 modelů, 94 značek*. [online] Autoforum.cz. Available at: <http://www.autoforum.cz/zajimavosti/nejprodavanejsi-auta-v-cr-v-roce-2015-100-modelu-94-znacek/> [Accessed 28 May 2016].

⁹⁵ Kuba, T. (2016). Interview - *BMW new car sales*. BMW Invelt, Praha

originally founded for the purpose of four-wheel drive system development. Later on, Quattro launched high performance versions for every Audi series such as RS4, or RS6. As the statistical data of Quattro GmbH and its RS versions cannot be publically accessed, the estimation could not be calculated.

ŠKODA is the most selling automobile brand in the Czech Republic and is perceived as a good quality car producer by Czech customers. Therefore, the customization of their vehicles seems to be reasonable for the Czech market, mainly for following models: Superb, Octavia, Fabia, and Rapid. ŠKODA is currently offering its higher level versions of models under sub-brands such as Laurin&Klement, RS, and Monte Carlo. All of these variations have been advertised as better looking and more powerful vehicles than the classical models. As already mentioned, ŠKODA Auto sold almost 74 thousand vehicles in the Czech Republic in 2015.⁹⁶ If the same percentage (between 2 % and 3,5 % for BMW and Mercedes as mentioned above) of customized vehicles is applied to ŠKODA annual result, the original auto manufacturer could sell between 1 400 to 2 600 customized automobiles in the Czech Republic in one year. Additionally, if there was more than one⁹⁷ external customizer for specifically ŠKODA automobiles active on the Czech market, such as Alpina is for BMW and Brabus is for Mercedes, a potential external volume of sales of ŠKODA modified cars could be estimated. Having stated that Alpina customizes in average 0,225 % of BMW cars and Brabus modifies approximately 0,5 % of Mercedes' cars on the Czech market, the total potential of annual high level modification volume is between 148 and 370 ŠKODA vehicles (Alpina - $0,002 \times 74\,000 = 148$; Brabus $0,005 \times 74\,000 = 370$).

Regarding luxury or super sport aftermarket car modification, the Czech market is seen as a low potential market. For example, Aston-Martin sold only one new vehicle in the Czech Republic, and other brands such as Ferrari, Bentley or Maserati struggled to sell more than 30 cars per year.⁹⁸

⁹⁶ Prokopec, P. (2016). *Nejprodávanější auta v ČR v roce 2015: 100 modelů, 94 značek*. [online] Autoforum.cz. Available at: <http://www.autoforum.cz/zajimavosti/nejprodavanejsi-auta-v-cr-v-roce-2015-100-modelu-94-znacek/> [Accessed 28 May 2016].

⁹⁷ Benet Automotive is an official Czech modifier of ŠKODA automobiles in the Czech Republic. However, the company does not publish any statistical data on its sales which disabled the author to use real data in his calculations.

⁹⁸ Žemlička, M. (2014). *Jaké luxusní a sportovní automobily jsou mezi Čechy nejpopulárnější*. [online] Novinky.cz. Available at: <https://www.novinky.cz/auto/325221-jake-luxusni-a-sportovni-automobily-jsou-mezi-cechy-nejpopularnejsi.html> [Accessed 12 Jun. 2016].

The outcome of the calculations for potential customized sales volume made above paragraph supports the author's opinion, that there is a higher potential for customization of different than premium brands in the Czech Republic. A higher potential has been observed for modification of middle segment brands such as ŠKODA or Volkswagen. To sum this part up, the potential for aftermarket automobile customization in the Czech Republic seems to be substantial, especially for external customizers for whom the unsaturated customization market in the Czech Republic might be very interesting.

3.2 After market customization

Nowadays, most vehicles leave the factory with the pre-set up for an average driver's expectations and conditions. Customization, on the other hand, has become a way to personalize the characteristics of a vehicle according to owner's preferences. There are two basic principles of automobile customization.⁹⁹

1. **Performance:** replacing or altering the drive securing parts such as the engine, transmission, or suspension
2. **Styling:** replacing, altering or/and painting in order to change factory set up according of an owner's preferences.

Table 3 provides the information about the integration levels of customization of an automobile as well as about the accessories which are purchased/used for a car modification made by individuals or customizers. The table is divided into three main categories of integration.

The first category is **LOW** level which is typical for small and detailed accessories mainly used within an interior of an automobile. Another level is described as **MEDIUM**, including the previous category of products plus larger, mainly exterior parts already having an effect on original appearance of the vehicle. The last one, also known as the highest form of customization, category **HIGH**, already composes of previous levels of modification and is characterized by performance customization.¹⁰⁰ The table shows what types of particular accessories belong to each integration level.

⁹⁹ Smith, S. (2007). *How to build a hot tuner car*. St. Paul, MN: Motorbooks, pp.17-20.

¹⁰⁰, Philippart, N. (2012). *Vehicle Personalization at Point of Sale: Developing an Integrated Business Strategy for Starting a New Business within a Mature Corporation*. 2nd ed. [pdf] Wayne State University,

Table 3: Integration levels of an automobile modification

Integration Levels	Types of Product
LOW	Fuel fill door, floor mats, tailpipe tips, vent visors, bug shields, interior storage devices, gear shift knobs
MEDIUM	Spoiler, exterior trim, grilles, ground effects, tube steps, running boards, interior trim, bed liners, cargo management systems
HIGH	All electrical accessories, performance exhaust, supercharger or turbocharger kits, wheels

Source: Philippart, N. (2012). *Vehicle Personalization at Point of Sale: Developing an Integrated Business Strategy for Starting a New Business within a Mature Corporation*. p.15

3.2.1 Areas of modification

If specific criteria are fulfilled, almost the whole automobile may be customized. The categories are divided into three main areas: exterior, interior, and driving performance. In most cases, one category influences another one. For example, wheels and tires have an impact on the actual look of a car as well as the driving performance.

Starting again with **body/chassis**, exterior of a vehicle can be mainly customized by adding or modifying a body kit or spoilers, which should primarily serve to improve the aerodynamic performance of an automobile in order to reduce the force of the wind tunnel. Regardless of the visual aspect, tuners can reduce the load of the vehicle by replacing a hood, rear view mirrors, or windows. On the other hand, glass usually adds to the weight of a vehicle but modifiers may apply to lighten the weight of the windows. As for plastic substitutes, these are much more vulnerable to scratches, and therefore vehicle is exposed to lower durability. In that case, the trade-offs among weights, durability and maneuver flexibility have to be evaluated.¹⁰¹ Nevertheless, the performance-oriented approach can be mainly found in the automobile races rather than in individual customization.

pp.2-15. Available at: http://engineering.wayne.edu/ise/get_case_studies/case_-_philippart_-_vehicle_personalization_at_point_of_sale.pdf [Accessed 7 Jan. 2016].

¹⁰¹Heißing, B. and Ersoy, M. (2010). *Chassis handbook*. Wiesbaden: Springer Science & Business Media, pp.9-16

Unfortunately, among non-expert customizers, body modifications are primarily conducted in order to improve the visual aspect of an automobile. There are several non-functioning aftermarket products such as only good looking scoops, wide arches, spoilers or body kits, which rarely increase the driving performance. On the contrary, some of those parts rather add weight and decrease the handling and cornering quality.

Suspension tuning focuses on improvement of the springs, shock absorbers, sway bars, and other related components of a vehicle which are oriented on absorbing the road difficulties. In most cases, the desired goal of suspension upgrade is to shorten the springs, thus providing better stiffness with lower gravity center with a risk of unwanted changes of suspension geometry¹⁰². In general, there are three main approaches in suspension modification:

The first off-road approach focuses on longer suspension and larger tires which leads to more comfortable and smoother drive through the rough roads or in the nature. Secondly, low-riders use hydraulic or pneumatic suspensions customization, for which each wheel can be individually adjusted, and the down force can be easily increased so that the actual appearance of a vehicle comes to the fore. The last approach introduced tuning which is oriented on the complete improvement of automobile handling. As suspension improves cornering and reduces body roll in the process of tuning a car, a rapid increase in the grip of tires can be observed.

The modifying process of the operating characteristics of a power unit is called **engine turning**. Typically, there are various mechanical and electronic components affecting the power output of the vehicle, as for example spark plugs, air flows or the intake manifold. With implantation of computer software which made it possible to use the ECM (Engine control unit), determination of the best balance between performance and emissions has become much easier. In common a tongue, this process is known as “mapping”. Moreover, it enables to increase the performance of a vehicle in order to get better output or to decrease the performance to reach lower fuel consumption.¹⁰³ Additionally, **extra turbo chargers, or compressors** can be applied for the purpose of speeding up the fuel

¹⁰² Ren, W., Zhang, J. and Jin, G. (2009). The Virtual Tuning of an Automatic Shock Absorber. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*, [online] 223(11), pp.2655-2662. Available at: <http://The virtual tuning of an automatic shock absorber> [Accessed 23 Apr. 2016].

¹⁰³ Banish, G. (2007). *Engine management*. North Branch, MN: CarTech, pp.10-13.

inflow.¹⁰⁴ Moreover, the **transmission** can be replaced or modified, thus enabling shorter shifts, achieving faster acceleration, and allowing achievement of the maximum possible speed.

Consequently, **tires and wheels** secure the attachment between the road and the vehicle, while having large effects on a car's behavior. Therefore, tire selection is one of the first modified parts of an automobile. Choices made of tires should be based on weather and road conditions and selected according to which type offers the better down force, top speed, or another desired performance. More often, one good looking set for winter and for summer is purchased by a customer.¹⁰⁵

Within **the interior**, customizers need to combine new technologies, comfort and the design which are supposed to show synergy and the added value to the driver and the passengers. For example, a traditional radio can be replaced by a one with the touch screen, or by smartphones' and other devices' implementation which fit into an automobile and are able to make the usage easier and more personal. A typical feature for the interior tuning is the high performance and a good quality sound system. Regardless of the entertainment, the dashboard, seats, doors and the complete interior may be customized by adding lines, stripes or other colors.

To conclude, the representatives of Brabus and Hamann, who were willing to provide the author with an interview, highlighted the major trends in the customization industry. Based on the interviews, approximately 20-30 % of the sales is represented by the complete customization of an automobile. The partial modifications required by the customers, such as new body kit, different wheels and tires, exhaust system or chipset unit, generate the biggest proportion of the total sales, between 70-80 %.¹⁰⁶⁻¹⁰⁷ That is why the customizers operating on the Czech market need to offer both the complete modification as well as the opportunity to install individual part only.

¹⁰⁴ Lee, S. (2008). Perturbation/correlation based optimal internal combustion engine tuning. *International Journal of Automotive Technology*, [online] 9(4), pp.429-436. Available at: <http://search.proquest.com.zdroje.vse.cz/docview/229583309?pq-origsite=summon> [Accessed 23 Apr. 2016].

¹⁰⁵ Bowling, B. (2003). *Complete Wheel and Tire Buyer's Guide*. Iola, WI: Krause Pub.

¹⁰⁶ Lehner, R. (2016). Interview – *Managing director*. Hamann GmbH, Laupheim.

¹⁰⁷ Simon, R. 2016. Interview – *Supply manager for Poland, Czech Republic, and Slovakia*. Brabus Group, Bottrop

3.2.2 Established styles of modification

The automobile races served as one of the first inspirations for vehicle customization. The origin of car customization can be dated back to the period between World War II and the beginning of environmental restrictions in 1960's in the United States. In this period, one of the most famous and first modification styles, Hot Rod Race, was introduced.

Overtime, many styles have been introduced and each of them has some specifics. Modified cars can be significantly different from their original models and counterparts. Generally, a common factor among modifiers is to emulate the visual part and/or the performance of a vehicle and to improve or change its characteristics. In the past century, many styles and design principles have been established. The primary source of inspiration is usually the racing specials such as rally cars, circuit specials, drift focused or top speed oriented vehicles.

Thanks to the modification enthusiasts, many styles have been introduced. The styles can be divided into three main streams according to the geographic location of their origin: European, American and Japanese. Few of them are described in the following paragraphs on the basis of their importance from the design perspective. However, several modification style are excluded from the list because of their irrelevance to design such military based tunings or sleeper cars which aim to stay at the same condition for a long time to maintain their value.

One of the first settled customization styles comes from the United States from the 1930's. This style is called **Hot Rod Style** and overtime, it became very popular among driving lovers. Those users desired to achieve the maximum possible vehicle performance in order to reach the as highest top speed possible.¹⁰⁸ Furthermore, the style was typical for its one base color with painted flames “burning” from the front hood to the rear. Out of this, **Rat Rod**, or **Rat style** evolved as they were highly inspired by Hot Rod. These two styles copied mainly the layout of an automobile and the performance from Hot Rod, and its uniqueness lies in open hoods with a visible engine and symbolic

¹⁰⁸ Ury, A. B. (2016). *A Short History of the American Hot Rod*. [online] Automotivetechnology.wyotech.edu. Available at: <http://automotivetechnology.wyotech.edu/articles/short-history-of-the-american-hot-rod> [Accessed 9 Jan. 2016].

“rotted” body parts.¹⁰⁹ Later in America, **Low-riders** appeared. Low-riders can be immediately recognized by their bright colors and highly adjustable hydraulic suspension systems which emphasize the look of a vehicle.¹¹⁰

Meanwhile in Europe, the automobile enthusiasts did not intend to achieve the top speed. Frankly, they focused on one off paint wheels and lowered stance (almost touching the ground) with waved features which highlighted the body lines of a car. This modification approach is named **Euro smooth look style**. In addition, the **German look** originated from the Euro smooth look style. The German look became quickly popular for its improved performance of the suspension and drivetrain systems with an emphasis on handling and cornering.¹¹¹

Globally, during the last two decades, so called **Import scene** modification became very famous. The name is derived from the import of Japanese automobiles as the cars from Japan are usually imported to a specific country and later modified. The modification includes implementation of aftermarket parts and race details as well as the combination of good performance and look.¹¹² A very typical style for Japanese customizers is so called “**Bōsōzoku**” style. This style is well-known for wide body kits, huge wings exaggerating exhausts, and overall enlarged exterior parts.¹¹³

Previous paragraphs mainly described the modification from the exterior and the performance perspective. Still, it is important to remember that interiors of an automobile are subsequently customized as well, although it does not include many strong established styles. Most of the modifications which concern interiors include following changes: in the steering wheel, better sound system, different or designed seats, customized dashboard, and other interior gadgets.

¹⁰⁹ Hot Rod. (2010). *Rat Rod History - Hot Rod Magazine*. [online] Available at: <http://www.hotrod.com/cars/featured/hrdp-1011-rat-rod-history/> [Accessed 16 Apr. 2016].

¹¹⁰ Bullard, L. (2007). *Lowriders*. Minneapolis, MN: Lerner, pp.3-9.

¹¹¹ TorqueCars. (2016). *Definitions of car styling looks*. [online] Available at: <https://www.torquecars.com/styling/car-styles.php> [Accessed 22 Apr. 2016].

¹¹² Lerner, P. (2003). Tuning Japanese. *Popular Science*, [online] 262(3), p.80. Available at: <http://search.proquest.com.zdroje.vse.cz/docview/222942476/fulltext/98696939604A43E7PQ/1?accountid=17203> [Accessed 20 Apr. 2016].

¹¹³ Kennedy, G. (2014). *Bosozoku Style: The Truly Odd Fad from Japan - Boldride.com*. [online] Boldride.com. Available at: <http://news.boldride.com/2014/01/bosozoku-style-the-truly-odd-fad-from-japan/19573/> [Accessed 20 Apr. 2016].

3.2.3 German market players

The following part briefly introduces several automobile modifying companies as the author considers them important for the research. For the purpose of this thesis, representatives of those firms were interviewed.

BRABUS Group was established in 1977 by Klaus Brackman and Bodo Buschman. It is one of the high-performance aftermarket customizers specializing in brands such as Mercedes-Benz, Smart and Maybach. The company is seated in Bottrop, Germany, where the production and development facilities are also located.

The company primarily focuses on increasing engine horsepower and torque by opening racing exhaust system, engine configuration, gear box modification, and turbo or compressors implementation. Moreover, Brabus performs exterior design, interior modifications and handling improvements which are achieved by different body kits, carbon fibers, special wheels and tires, or high level breaking systems installation. Brabus is mainly oriented on AMG versions of Mercedes-Benz and its aim in this field is to create even more original design and improve the performance level of these vehicles.

As for the services, Brabus provides its clients with a possibility of purchasing already finished tuned car from the prepared model series, or the client simply brings his/her automobile to the Brabus establishment where required modifications are made. In case a customer orders a brand new automobile, Brabus is directly involved in the purchase process and the company provides the delivery of the automobile. Besides other Brabus' divisions, for example Brabus Aviation, the company also focuses on historical cars in the department of Brabus Classics.¹¹⁴

Startech is a part of Brabus group which is oriented on the modification of Bentley, Jaguar, Land Rover and Range Rover according to customer's preferences.¹¹⁵

Hamann Motorsport GmbH is an automobile customizing company based in Lauphain and founded by a racer, Richard Hamann, in 1986. The company offers cosmetic and performance modification mainly for passenger automobiles such as BMW, Range

¹¹⁴ Brabus.com. (2016). *Brabus*. [online] Available at: <http://www.brabus.com/en/startpage.php> [Accessed 11 Jul. 2016].

¹¹⁵ STARTECH. (2016). *Startech tuning*. [online] Available at: <http://www.startech.de/en/> [Accessed 10 Jul. 2016].

Rover, Land Rover, Porsche, Lamborghini, partly Ferrari, Rolls-Royce and Aston-Martin. The major difference between Hamann and Brabus is that Hamann does not provide the possibility to purchase a vehicle directly from the modifier but the customer brings his/her vehicle to the Hamann establishment for the required modification.¹¹⁶

Alpina is a German customizing company focusing only on modification and technological innovations of BMW automobiles already since 1965.¹¹⁷

3.2.4 Czech competitors

Benet Automotive, also known under abbreviations BT, is one of the Czech complete automobile modifiers specializing on ŠKODA cars. The company's product portfolio is focused on models as Octavia, Fabia, Superb and Yeti. It offers all aspects of tuning from design perspective, by customization of exteriors and interiors, to performance improvements. BT direct competitor is for example German customizing brand ABT which is oriented mainly on AUDI but includes also ŠKODA vehicles in its portfolio, or Swedish competitor BSR.¹¹⁸⁻¹¹⁹⁻¹²⁰

Beside Benet Automotive, the author did not find any originally domestic companies with the same scope of business. On the other hand, there are several companies in the Czech Republic which concentrate on various types of individual parts of customization mainly from the technological perspective (such as engine chipsets or exhaust systems). Moreover, many e-shops and stores specialized on tuning are presented on the Czech market. However, these e-shops and stores do not provide customization service and design development but offer individual design and performance tuning products separately.

¹¹⁶ Hamann-motorsport.com. (2016). *HAMANN*. [online] Available at: <http://www.hamann-motorsport.com/> [Accessed 11 Jul. 2016].

¹¹⁷ Alpina-automobiles.com. (2016). *ALPINA*. [online] Available at: <http://www.alpina-automobiles.com/en/> [Accessed 11 Jul. 2016].

¹¹⁸ BT Project. (2016). *Benet Automotive*. [online] Available at: <http://www.bt-design.cz/uvod> [Accessed 14 Jul. 2016].

¹¹⁹ BSR Perfomence. (2016). [online] Available at: http://www.bsrczech.cz/?gclid=CjwKEAjwZa9BRCw7cS66eTxICkSJAC-ddmw5Ndo7FoxPRZi7aA4gLvroqNSBBJe0FKQXcbauYE_qRoCZUvw_wcB [Accessed 14 Jul. 2016].

¹²⁰ Abt-sportline.de. (2016). *ABT Tuning - Audi, VW, Seat, Škoda*. [online] Available at: <http://www.abt-sportline.de/> [Accessed 14 Jul. 2016].

In general, Czech customization market is dominated by foreign brands which have their distributors located in the country. These foreign brands include for example Autonagy group which offers modifications prepared by Hamann, or Hošek Motor distributing Brabus' and Carlsson's customization products.

3.2.5 Types of vehicles, brands and mostly customized models

As it was already mentioned, any vehicle can be customized due to the settings in which cars are mass produced. Nevertheless, mainly the premium, luxury or sport brands are in the point of interest of aftermarket customization companies. This statement is based on the 86th Geneva International Motor Show where some of the modifying companies were presenting their products.

Out of all famous customizing companies presented at the Autosalon, Brabus occupied the largest proportion of the Show from the perspective of square meters used. The visitors could admire the tuning of Mercedes-Benz as well as Classic cars, and its sub-brand, Startech, represented by Jaguar, Bentley and Range Rover. As Brabus' customized vehicles are mainly characterized by its black paint, all exhibited automobiles from Brabus had this color. Nevertheless, this attribute is not applied for Brabus Classics vehicles in which a painting color typical for the specific era of production and model is used. Brabus' sub-brand, Startech, also exhibited customized models in Geneva. Due to the fact, that the sub-brand has a different name from its parent company, the Startech's models are not obliged to have only black paint. Still, Startech uses mainly dark colors for the main body paint.

Another tuning company, Mansory, had its stall next to Brabus. Mansory is a luxury tuner which focuses mainly on the very niche market of the most luxurious and prestigious vehicles. For the Geneva Show, Mansory presented its own versions of Rolls-Royce, Bentley, and Range Rover. Nevertheless, Mansory decided to show only a small part of its portfolio out of which the most valuable brands are Bugatti Veyron, Maserati, McLaren or Lamborghini.

As for Hamann, the best of their modifications were exhibited in Geneva - from customized Porsche Macan, and BMW M4 to BMW X4. Not only the most famous and the biggest customizers participated on the show. Among the smaller exhibitors, these companies were presented: ABT, Project Kahn, KLASSEN, Fab Design, and TechArt. During the research, the author confirmed his assumption that mainly the primary and luxurious brands are in the point of interest of these smaller companies. In addition, there were no companies which would show customized versions of middle class vehicles such as ŠKODA, Volkswagen, or Seat. A detailed overview of the manufacturers and their ordinary customizers can be seen in Table 4.

In order to get a better understanding of which brands are mostly used for customization, the following categorization of the table was created. As the table shows, in general, the modifying companies' portfolio contains very similar automobile brands. The most customized brands are BMW, Mercedes-Benz, Audi, Land Rover/Range Rover, Porsche, Jaguar, Bentley, and Lamborghini. Only such customizers, which provide complete modification of the automobiles in terms of design and performance, were selected.

Table 4: Automobile manufacturers and their customizers

Manufacturer	Customizer
BMW	Hamann, Alpina, Mansory, AC Schintzer, G-power, Lumma
Mercedes-Benz	Brabus, Fab Design, Mansory, Carlsson
Lamborghini	Hamann, Fab Design, Nimrod, Mansory
Porsche	Hamann, TechArt, Fab Design, Mansory, Lumma
Land Rover, Range Rover	Hamann, Startech, Fab Design, Klassen, Project Kahn, Mansory, Lumma
Bentley	Startech, Mansory
Jaguar	Startech
AUDI	ABT, Fab Design, Mansory, Caractere performance

Source: 86th Geneva International Motor Show, Customizers' webpages

As the table shows, almost all customizers are, at least partly, interested in Land Rover and Range Rover tuning. For example, in case of Hamann Motorsport, Land Rover and Range Rover brands are the second most customized vehicles by this company.¹²¹ On the other hand, Project Kahn and Klassen are specialized only in those brands which manufacture passenger vehicles.

¹²¹ Lehner, R. (2016). Interview – *Managing director*. Hamann GmbH, Laupheim.

To point out, customizers use nearly the whole product portfolio of the original auto manufacturer but often decide for modification of the most advanced versions of the models. For instance, the M performance cars are used for tuning BMW's automobiles, the AMG versions are used when modifying Mercedes-Benz's vehicles, and Audi's RS and S models are mostly customized. Nevertheless, the tuning companies strive to be oriented on all types of passenger vehicle categories in order to attract as many customers as possible.

3.3 Customization design and performance trends

The following paragraphs aim to recognize the differences between the original and customized models from the perspective of the design in interior and exterior, and performance. For the purpose of identification of the trends on the current automobile aftermarket customization market, the author conducted his own research on the 86th Geneva International Motor Show and in Brabus', Hamann's, Alpina's, and Startech's showrooms.





3.3.1 Differences between original and customized model

As already mentioned, modification has two parts: the visual one and the performance one. Starting with the exterior surface customization, it has been observed that it is a very complex process, and at the same time the key aspect from the design perspective. The designers have to always remember that the performance and handling cannot not be downgraded or negatively affected. On the contrary, the performance and car handling can be even improved if additional design components are installed.

As all interviewed representatives agreed, the goal of any complete automobile tuning is to find the best balance between design and performance. That is why the actual impact of replacing or modifying a particular component has to be considered from the perspective of design and performance. They concurred that it is very challenging for designers to make the automobile outstanding but not too extravagant. The modification process is perceived as a process of creating a masterpiece out of an already great product.

In order to evaluate the current exterior and interior trends, the areas of modification between the original and the customized models of particular brands were compared. For better understanding, Table 7 will show the differences among the original version of BMW M4 and its customized versions (by Hamann and Alpina). Another example can be found in Annex II. As the picture in table below display, the replacement of surrounding spoilers, front and rear bumpers are the main modifications. Moreover, both Hamann and Alpina added the rear wing and changed the tires and wheels. From the performance perspective, the exhaust system was replaced which now higher torque, and in case of Hamann higher the power as well.

Table 5: Original BMW M4 vs. customized versions

Customizer 1 Hamann Motorsport		Original Model BMW M4	Customizer 2 Alpina B4 Biturbo
			
			
Power	517 HP	431 HP	410 HP
Torque	700 Nm	550 Nm	600 Nm
0-100 km/h	4 s	4,1 s	4,2 s
Top speed	280 km/h	250 km/h	302 km/h

Source: Author's own creation based on Hamann, BMW, Alpina webpages

Design and look

Based on the observations from the Geneva Autosalon and the customizers' showrooms, the most significant changes from the visual perspective are done around bumpers, spoilers, or smaller wings. In comparison to the original models, the customized models have one dominant, platform, color which serves as a background highlighting the other colors. The other colors on the car are usually more extravagant: it is typically orange,

shiny green, purple, red, yellow or gold. On the other hand, the platform color is very often settled, deep dark black, grey, white, and in general less shiny colors. In addition to colors, the carbon fibers with typical grey and black chessboard motives are used when customizing a car. In some modified cars, the equipment might be also visible from the outside and the color of these equipment usually corresponds to the minor colors used on body kit or wheels. Moreover, most of the customizers tend to replace the logo of the original producer and replaced it by its own. Additionally, many of the modified models are often renamed according to their modifying company. Nowadays, the roots of “German look” style can be observed in the customization trends.

When the original and the customized models are put next to each other, it is still obvious that the original concept of the automobile is hold. The modification can be observed mainly in details, for example in a shape and a color of surrounding spoilers. Some modified vehicles include also rear wing, or dark glass. Most of the time, the modified wheels, tend to be larger or wider than the originals, can be immediately recognized. As for the shape, the additional parts are designed and replaced in such a way that the original shape is maintained. Overall, all parts of the customized car should look compatible. Regarding the interiors, the color layout might either correspond to the exterior painting or be different than that of exterior.

Performance

As already mentioned, the carbon fibers are nowadays very popular among customizers. Not only the stylish look of the carbon fibers, but its light weight, which has a positive effect on the performance of a vehicle, is an important decision factor for their usage. Firstly, in terms of performance customization, there are four main areas in scope of interest: improvement of horsepower, torque, acceleration and top speed. The customization companies often install additional turbo, chipset or different “engine map”. As realized in Brabus, there is a high favorability of exhaust systems replacement among customers as it helps to increase the power output, and is positively affecting the rear look of the vehicle with an extra benefit of having a better sound. If generalized, there is an increased power output customized vehicles mainly in top speed and acceleration, which is secured by improvement of horsepower and torque. Moreover, breaks and suspensions are modified or changed in order to improve handling of a vehicle.

Regarding the Czech market, the author recommends that the power should not be that emphasized. Firstly, the Czech customers are generally more design and exterior oriented. The second reason is the lower purchase power of inhabitants in comparison to Germans because of the increasing price of the modification. Moreover, the Czech customers do not find the importance of power and handling too important due to for lack bad quality Czech roads.¹²²

3.3.2 Individual customization provided by the automobile manufacturers and customizers

There are many various versions and potential individual changes for each model as the original producers aim to attract as wide customers' range as possible. Nowadays, each automobile manufacturer provides a simple way how a buyer can customize his/her vehicle according to his/her will. Additionally, it also includes a possibility to calculate the total price of the final product. A customer usually comes with pre-prepared version of his/her desired model to check it in the showroom. In order to attract customers who wish to have sport versions, high performance vehicle, or more luxurious looking car, the configurator offers combination of different types of settings. Buyers are given the opportunity to have sport looking cars with the less powerful engine (BMW: M-packet, Mercedes-Benz: AMG design, 45AMG, Audi: S-line), their appearance is based on design style of the highly customized models. Those sport looking bundles are highly valued by the Czech customers as they prefer exterior look before the high performance. Delivery of such vehicles is from 5 to 6 months which is not really different from normal versions.^{123,124}

There are several approaches to the modification of an automobile of each individual customizer. For example, Hamann always delivers its tuning services in a package and the minor design details of the modification are developed by the company internally **as the surprise effect** for the customers is a crucial part of Hamann's modification process. Firstly, the potential customer searches Hamann's web pages for basic information.

¹²² Polanský, O. (2016). *Interview - New automobile sales and AMG expert*, Mercedes-Benz Praha.

¹²³ Kuba, T. (2016). *Interview - BMW new car sales*. BMW Invelt, Praha

¹²⁴ Polanský, O. (2016). *Interview - New automobile sales and AMG expert*, Mercedes-Benz Praha.

Afterwards, he/ she calls the tuner to inform himself/herself about the customization possibilities of a car he/she owns. Later, the automobile is brought to Hamann where it is decided what parts will be modified and what the price will be. The car stays in the company for about 3 weeks until the final modification is done.¹²⁵ Very similar findings apply to Startech as well.¹²⁶

On the other hand, Brabus has its own, specially named, vehicles based on Mercedes cars which are even more customized than the Mercedes AMG models. Those automobiles can be directly ordered from the manufacturer as brand new vehicles. Brabus has its own online configurator which offers an opportunity of small modifications. As in case of Hamann or Startech, the design and performance customizations are developed, and also partially produced, internally within Brabus' factories. Usually the modification of brought passenger vehicle takes between 4 and 6 weeks, if the car is purchased from Brabus it depends on what actual model it is as Brabus is dependent on Mercedes-Benz delivery time.¹²⁷

3.3.3 Differences in showrooms

The main difference between the automobile tuners' and original manufacturers' showrooms were examined, mainly in terms of the size of the showroom itself and the number of models exposed in the dealers' shop.

The original producer's dealership network is much larger than the automobile modification market itself which leads to a higher competition even among the dealers. Due to this fact, the size of the original producer's showroom plays a very significant role as bigger showrooms provide the opportunity to have more products in more versions exhibited. As the research proved, the physical examination made by the customers greatly influences their purchase decision.

¹²⁵ Lehner, R. (2016). Interview – *Managing director*. Hamann GmbH, Laupheim.

¹²⁶ Simon, R. 2016. *Interview – Supply manager for Poland, Czech Republic, and Slovakia*. Brabus Group, Bottrop

¹²⁷ Simon, R. 2016. *Interview – Supply manager for Poland, Czech Republic, and Slovakia*. Brabus Group, Bottrop

The opposite case was observed in tuner's showrooms which are generally smaller and only few modified models are exhibited. The customizers strive to convey a sense of uniqueness as each individual vehicle should be perceived as special. For example, the BMW Invelt's dealership looks like a parking place for many BMWs where all of the displayed automobiles park next and behind each other. On the other hand, in Hamann, Startech and Brabus showrooms', the arrangement of the automobiles looks random and each individual model stands separately from the others.

One of the main reasons for customers to visit a showroom is the physical observation and the test drive. No availability of the test drive is seen as a negative factor for automobile tuning companies. The author realizes the competitive advantage of Brabus and Alpina which offer the test drive to their potential customers who can drive the car either alone or with the company's driver.^{128,129} The importance of test drives on the Czech market is analyzed further in this chapter.

3.3.4 Cooperation between automobile manufacturer and customizer

The level of cooperation between automobile producer and its customizer is crucial when customizing new models of vehicles as the guarantees and warranties are considered. The practice is that with a purchase of a brand new vehicle, the manufacturer is obligated to provide the customer with legal guarantees. However, as in any business, the producers try to reduce the risk of profit loss by providing several conditions which need to be fulfilled in order for a customer to have a legal right to claim warranty.

Due to its good relationship with BMW, the tuning company **Alpina** has an access to all important information and is able to actively participate on the styling development of BMW automobiles during the development phase. BMW cooperates with Alpina's representatives on specification of parts suitable for customization and even leaves some space for Alpina's suggestions and needs. This cooperation provides Alpina with a great advantage against its competitors as they can start with the customized versions earlier than the others. Moreover, Alpina is granted all guarantees and warranties from BMW

¹²⁸ Kuba, T. (2016). Interview - *BMW new car sales*. BMW Invelt, Praha

¹²⁹ Simon, R.(2016). *Interview – Supply manager for Poland, Czech Republic, and Slovakia*. Brabus Group, Bottrop

which is very beneficial. Being part of BMW dealership, the after sale service such as oil or break liquid exchange is also ensured. The main disadvantage of Alpina is its focus on only complete customization as the partial customization (modification of an engine or body kit) is not offered.¹³⁰

On the other hand, **Hamann** has much wider product portfolio in terms of brands. BMW's car the most sold ones, followed by Land Rover/Range Rover and Porsche. One of the main disadvantages of this customization company is the issue of no guaranteed access to design layouts and technical information about a product before its release. In consequence, the modifier has to wait until the official distribution of a new automobile starts. As soon as the first model of an automobile is launched, if evaluated as suitable for aftermarket customization, the customizer purchases the vehicle, brings it to the workshop where it is dismantled and the modification process can begin. The design of the components is developed internally in Hamann and the suppliers produce the designed components purely for Hamann's needs.¹³¹

As the managing director of Hamann, Robert Lehner, explained, the original manufacturers are trying to keep its models as secret as possible until their release date, even though the after sale customization is a really niche market. The original manufactures such as BMW aim to maximize the configuration possibilities of their models and therefore, they do not share the new model layout plans with the external customization companies. Even though Hamann customizes the vehicles, the aftersale service, guarantees and warranties remain on the side of the original manufacturer and its dealers. Generally, if a problem arises, there is often a conflict among the customer, original producer and tuning company. The conflict is mainly about (not)approved modification done outside of the official dealership, in terms of breaking guarantees, warranty laws and duties.^{132,133}

Due to its joint venture with Daimler, **Brabus** has a good relationship with Mercedes brand which is a subsidiary of Daimler. Brabus is allowed to access the information about the newly released Mercedes' automobile models before their distribution but does

¹³⁰ Kuba, T. (2016). Interview - *BMW new car sales*. BMW Invelt, Praha

¹³¹ Lehner, R. (2016). Interview – *Managing director*. Hamann GmbH, Laupheim.

¹³² Lehner, R. (2016). Interview – *Managing director*. Hamann GmbH, Laupheim.

¹³³ Kuba, T. (2016). Interview - *BMW new car sales*. BMW Invelt, Praha

not participate in the development of these models. The customizer focuses mainly on its own improvements of the automobiles. Even though the original guarantee is disrupted, Brabus provides its customers with the guarantee and warranty programs of their own. The specifics of the guarantee program offered by Brabus are explained in Table 5.¹³⁴

Table 6: Brabus' guarantee program

Months/ kilometers	Guarantee period
New car = no more than 200 km	36 months
No older than 6 M/ or no more than 10.000 km	24 months
No older than 12 M/ or no more than 30.000 km	12 months
If older than 12 M/ or more than 30.000 km	No guarantee provided

Source: Simon, R.(2016). *Interview – Supply manager for Poland, Czech Republic, and Slovakia*. Brabus Group, Bottrop

3.4 Target market

Generally, the buyers of outstanding vehicles are action-oriented and they base their purchase decision on psychical and social activities. The target consumers seek to experience impulsiveness and excitement. Moreover, they do not feel the need to be perceived as a part of a larger social group but rather as outstanding individuals. Having taken a deeper look, the customers have their own personal reasons why they purchase customized automobiles, such as “for the audience” or to fulfill “hidden private desires”.¹³⁵

The purchasers of luxury and expensive vehicles usually claim that the reason behind their purchase was the fact that luxury automobile is more comfortable, safer, holds value, and that its quality and durability are better. Lastly, the latent motives include the power of the car, outstanding and overall “sexy” looks due to its higher perceived status.

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¹³⁴ Simon, R.(2016). *Interview – Supply manager for Poland, Czech Republic, and Slovakia*. Brabus Group, Bottrop

¹³⁵ Carducci, B. (2009). *The Psychology of Personality*. 2nd ed. Malden, MA: Wiley-Blackwell, pp.119-120.

¹³⁶ Mitchell, J. (2008). *What Your Car Says About You*. [online] Forbes.com. Available at: http://www.forbes.com/2008/11/21/car-buyer-types-identity08-forbeslife-cx_jm_1120cars.html [Accessed 11 Jun. 2016].

The following target market summary presented in Table 6 is based on the targeting strategy of Mercedes and BMW, and additionally includes specific features typical for universal aftermarket customizers which were observed by the author during the research. The table is divided into four main categories of demographic, geographic, psychographic and behavioral segmentation.

Table 7: Market segmentation for aftermarket modification

Demographic	Age:25-55, mainly males, higher income level
Geographic	Any market in the world
Psychographic	Upper class, stylish differentiation seeking, expressing status and position in the society, success, prestige, materialistic, valuing style/design and performance
Behavioral	Ambitious, automobile and/or race lovers, people willing to take risks, young thinking people, loyal (origin brand), appreciating high performance and handling

Source: Interviews, Market segmentation of BMW and Mercedes-Benz

Besides the target market characteristics presented in the table above, there are two more main aspects affecting the purchase decision of a modified car. The first reason is the customer's personality. As Mr. Polansky during the interview said: *"A driver willing to buy AMG has to have auto lover's hearth, and has to value the performance and design of cars in general."* The second factor affecting the actual purchase is the purchase power of a customer as most buyers are not willing to become indebted in order to have additional vehicle good looking parts and performance upgrades.

Due to the fact that all interviewed representatives agreed that Czech customers are oriented on the visual appearance and the sound of an engine of a vehicle, the customizers should focus mainly on the design customization and exhaust system in the Czech Republic.

¹³⁷ Rani, P. (2014). Factors influencing consumer behavior. *Int.J.Curr.Res.Aca.Rev*, [online] 2(9), pp.52-61. Available at: <http://www.ijcrar.com/vol-2-9/Pinki%20Rani.pdf>.

3.4.1 Consumer behavior and purchase decision

Consumer and purchase behavior has always been in the center of attention of automobile marketers because of the big competition and many possibilities which the market offers for the potential buyers. Above all, there are three fundamental aspects influencing the decision making process: economical, functional, and psychological aspects. Additionally, the secondary research showed that the most influencing individual factors of making a purchase decision are the price, safety and fuel consumption followed by design, style and performance.¹³⁸⁻¹³⁹

Generally, people who decide to buy their first automobiles are not the ones who would prefer the modified versions. As the representative of BMW Invelt in Prague expressed, usually people start with a purchase of the standard version of an automobile, and later on, they become willing to pay extra money for a better performance or design. Moreover, the customized vehicle purchased by a customer is often the second or the third one in the family¹⁴⁰

In addition, the collected information show that the loyalty of the customers to the original manufacturers plays a very important role for the car tuning purchase decision. As the interviews proved, a potential customer needs to love the original brand itself at first in order to even consider the customization. Thanks to that customization of ŠKODA automobiles could have growing potential in the Czech Republic as its sales and popularity steadily increase. According to the demographic categorization, people between 25 and 30 years tend to buy smaller or sportier versions of the model, for instance: BMW M1, M2, M4 coupé or cabriolet, or A versions of Mercedes-Benz. With higher age, their preference shift towards M5 or M6, or Mercedes-Benz C classes.

This shows that modification of hatchbacks and sedans such as ŠKODA Fabia, Rapid and Octavia, or Volkswagen Passat or Golf could be potentially in the interest of Czech

¹³⁸ How Important is 'Vehicle Safety' in the New Vehicle Purchase Process?. (2005). 1st ed. [pdf] European Commission, pp.56-60. Available at: http://ec.europa.eu/transport/roadsafety_library/publications/sarac2_4.1.pdf [Accessed 11 Apr. 2016].

¹³⁹ Herald, T. (2008). *The Three Factors That Affect Consumers' Purchase Decisions*. [online] Autodealermonthly.com. Available at: <http://www.autodealermonthly.com/channel/dps-office/article/story/2008/02/the-three-factors-that-affect-consumers-purchase-decisions.aspx> [Accessed 29 May 2016].

¹⁴⁰ Kuba, T. (2016). Interview - *BMW new car sales*. BMW Invelt, Praha

customizers offering their products for the domestic customers whose age is up thirties. On the other hand, for people above thirty, a customized versions of ŠKODA Superb and Octavia, or Volkswagen Passat and SUVs (Tiguan, Tuareg), might be attractive.¹⁴¹

3.4.2 Czech customer characteristics

During the automobile purchasing process, Czech customers are primarily divided into two types of buyers. The first ones are those who always prefer to buy used car because they have a feeling that the new cars are unreasonably overpriced. Furthermore, people who are willing to buy a better brand and have a lower income prefer used cars due to their affordability. On the other hand, the second group of buyers is willing to buy a brand new car. Usually, customers who are purchasing only used cars are very hard to convince to buy a new automobile. However, under certain conditions, some of the consumers who prefer new cars are willing to buy a used car. The number one factor influencing the purchase decision in the Czech Republic is the price of a vehicle. An average Czech buyer is willing to spend from 200 thousand to 500 thousand Czech crowns for a vehicle (from around 7 300 Euros to 18 200 Euros).¹⁴² Furthermore, the price negotiations are typical for the Czech market. If a customer gets a discount, he/she feels more valuable, and therefore more convincible to the car purchase. It is important to point out that the price affects all automobile categories purchase decision, no matter if a cars costs 10 000 Euro or 50 000 Euro. The second most important factor is the brand, because consumers perceive the automobile brands as a guarantee of quality.¹⁴³

That is why, the showroom observation and test drive play a very important role for the Czech customers as the model offered for the test drive is usually one of the best versions of an automobile. Moreover, the test drive has a great influence on the purchase decision and the seller often strives to convince a potential customer to borrow a car for the test drive which usually shortens the decision making process. From the seller perspective,

¹⁴¹ Polanský, O. (2016). *Interview - New automobile sales and AMG expert*, Mercedes-Benz Praha

¹⁴² Matějka, J. (2014). *Čech je ochoten za nové auto dát v průměru 300 tisíc korun*. [online] E15.cz. Available at: <http://zpravy.e15.cz/byznys/obchod-a-sluzby/cech-je-ochoten-za-nove-auto-dat-v-prumeru-300-tisic-korun-1060525> [Accessed 5 Jun. 2016].

¹⁴³ Sůra, J. (2016). *Jak Češi kupují auta? Rozhoduje cena, značka a možnost smlouvat*. [online] iDNES.cz. Available at: http://ekonomika.idnes.cz/jak-cesi-kupuji-auta-rozhoduje-cena-znacka-a-moznost-smlouvat-puw-/ekonomika.aspx?c=A160524_111043_ekonomika_lve [Accessed 21 Jul. 2016].

the test drive helps to convince the customer to decide for a better variation of the automobile model, and on the hand, the buyers can find out if they like the performance, stiffness and handling of the car. In case of customer's satisfaction with the car, the seller can offer additional car accessories and/or discounted price. On the contrary, a customer might realize that the car setting does not meet his/her requirements and the sale fails.¹⁴⁴

3.5 Challenges and Limitations of the business

During the research, two main challenges and risks for the automobile aftermarket customization were observed. The first one is the aspect of guarantees and warranties as the original manufacturers try to protect their own services which are part of the business itself. If a car undergoes an unoriginal intervention into its mechanical function, the customer's warranty and guarantee law is invalid. That is why many car modifiers are exposed to loss of potential customers. This exposal was confirmed to be the main threat for Hamann and Startech which do not have any relationship with the original manufacturers. Some customizers, such as Alpina, cooperate directly with the automobile producers. Therefore, they can provide their customers with aftersale original service without a risk of losing the guarantee. On the hand, there is another way for the customizer to solve the guarantee issue and that is the Brabus solution mentioned in chapter 3.3.4.

The second limitation of the business is the high proportion of new cars which are financed by operative leasing. If a car is financed by an external company, the owner is not allowed to do any modification of the car. This is a huge disadvantage for the aftermarket tuning as many potential customers are immediately excluded from the target group. Nevertheless, the Hamann manager highlighted that the threats often create opportunities. Hamann sees a big potential in the customizing of automobiles sold by leasing companies after their usage. This information has been confirmed during the visit of Hamann's showroom in which two out of eight exhibited models were four or more years old.

¹⁴⁴ Kuba, T. (2016). Interview - *BMW new car sales*. BMW Invelt, Praha

3.6 Potential of aftermarket customization on the Czech market

Even though the automobile customization market in the Czech Republic is very niche, the Czech market has a potential and might be quite profitable. As mentioned in the previous chapters, the German aftermarket customization is well established and the research proved that the Czech customization market is still unsaturated, and therefore offers a high potential. Having different economic environment and consumer behavior of automobile buyers than Germany, the business model would have to be modified in several ways.

Firstly, the premium and luxurious automobile segment has a lower proportion in the Czech Republic than in Germany. For this reason, the passenger vehicle portfolio for modification should be changed. Instead of tuning the upper segment automobiles, the attention should be drawn to middle class brands such as ŠKODA and Volkswagen automobiles as these two brands sell the highest amount of cars in the Czech Republic.

Due to a small competition among professional customizers of middle class brands in the Czech Republic, the foreign or domestic modifiers could enter this segment. The author suggests creating a new brand name for this type of vehicles, so that they are not mistaken for the premium brands customization. Next, the modification style should be based on “German look” which is used by the German modifiers as well. As already stated the “German look” is characterized by bigger wheels and tires, lowered suspension, modified body with single base color, and supportive highlighting paints. This could be the most profitable approach from the customization point of view, as the Czech drivers are mainly interested in the exterior design and are also willing to spend the money for this type of modification. On the other hand, the performance improvements are not that important because Czech customers, in general, prefer comfort and smooth drive with diesel engines rather than having very powerful automobiles.

One of the most important steps a future successful customizer on the Czech market should take is to provide the potential customers with the possibility of test drives and to build a representative showroom. Probably the best idea would be a direct cooperation with ŠKODA dealer (what Alpina together with BMW do) where the customized models would be offered and possibly tested. The author believes that such an opportunity could affect the purchase decision of the modified automobile. In addition, this could be

suitable for the Czech market as the Czech customers enjoy the feeling of buying a good quality product for a good price and ŠKODA meets these conditions. As the Czech people value the design of an automobile more than the performance, the customization of different automobile components should be the main service offered by the modifying company.

Furthermore, the potential opportunity of the customizing companies on the Czech market is the result of a low competition in this segment in the Czech Republic. Also, there is a huge profit opportunity for customizing companies in case they would focus ŠKODA automobiles' modification as there is only one domestic customizer company on the Czech market

As the test drive crucial is for the Czech customers in their purchase decision, the possibility to drive the modified version of an automobile could help to promote the sales. Due to high favorability of used vehicles and the termination of car leasing contracts, there is another potential opportunity for the automobile customization on the Czech market as these vehicles do not have any guarantees and warranties limits.¹⁴⁵

The main outcomes of the thesis are following:

- In Germany, the automobile aftermarket customization for premium segment is highly competitive and the German customizers already have their representatives on the Czech market
- The middle class segment modification is relatively unsaturated in the Czech Republic
- The biggest potential for customizers on the Czech market is to focus on middle class vehicles modification as these automobile segment is the most favored by the Czech drivers

¹⁴⁵ Šitner, R. (2016). *Oživení ekonomiky se odrazilo v růstu objemu leasingů. Lidé kupují spíš nová auta než ojetiny*. [online] Hospodářské Noviny. Available at: <http://byznys.ihned.cz/c1-65159160-oziveni-ekonomiky-se-odrazilo-v-rustu-objemu-leasingu-nova-auta-si-porizuji-firmy-i-domacnosti> [Accessed 12 Jul. 2016].

CONCLUSION

The ultimate goal of the thesis was to make an overview of the automobile aftermarket customization and to find out whether there is a potential for customization on the Czech market. In order to achieve this goal, three specific aims were determined. The first one focused on product design and its importance from consumers' perspective in general and subsequently with an emphasis on automobile industry. Secondly, external and internal factors influencing automotive design were observed by investigating automobile shape, technology innovations, and changes over time. Moreover, the second chapter considered customers' specific preferences in a particular period of time. Lastly, the primary aim was to evaluate the automobile aftermarket customization business segment and its potential on the Czech market. This aim could have been achieved by the research conducted on the German market and by considering current conditions of the automotive industry in the Czech Republic.

In the first chapter, the importance of product design was highlighted. It was pointed out that the design of a product has been crucial for customers since the time of mass consumption when people sought to differentiate themselves from each other by having different clothes, jewelry or bigger houses. Nevertheless, it was the introduction of industrial design during industrial revolution era that changed customers' perception of the product appearance. This explains why people started to more and more appreciate the actual design of the products. Further, the chapter proved that technology has a great impact on product development and that producers value not only functionality but mainly design which attracts customers at the first sight. In addition, the author emphasized the benefits of lower costs and shorter time period of the development process due to usage of computer and its related software. Overall, all investigated information proved that the categorization of the main factors to be followed when designing a new product is reasonable and should be followed. Mainly, this chapter provided the general knowledge about aspects influencing the design of consumer goods and their importance for automobile aftermarket customization.

The second chapter started with an introduction of automobile industry and with the current perception of passenger vehicles. Due to the fact that car modification has two main approaches - design and performance - these two main aspects were evaluated from

the historical development point of view. It was observed that the impact of external factors, such as economical, technological or social, on automobile's style and power is significant. Even though each investigated period was special for its different effects on automobile development, one specific effect which all of the periods had in common was observed. It is the satisfaction of consumer's needs and desires based on external factors influencing the society which is not dependent on time. Moving on, the next part of the chapter focused on the categorization of passenger vehicles and the increasing desire for more types of cars due to different desired needs of drivers. That is why, in the past 40 years, the number of categories escalated. In addition, this part also showed which passenger vehicles fit the most for the customization. Following investigation of new automobile development process explained the procedure itself as well as each individual step during the design cycle. Thanks to that the internal and legal influences affecting new passenger vehicle production were discovered as it is necessary for understanding of the automobile customization. In general, the first two chapters formed the theoretical basis for the thesis and suggested how automobiles can be customized in order to satisfy even the deepest needs and desires of the potential buyers.

The final chapter evaluated the automobile aftermarket customization size with an emphasis on further estimation of the potential size of the Czech market which is not as highly developed as western European markets. Afterwards, several market players and their products from design and performance modification perspective were researched in order to realize current automobile customization trends. Moreover, the analysis showed which individual parts are mostly customized and which established features of modification styles are applied. Those findings served for creation of possible automobile brand and model portfolio which could be used in the Czech Republic which would attract as many customers as possible. It was crucial to define the target market, its characteristics, purchase behavior, and how they are affected. All the knowledge was firstly applied to customers in general and subsequently to potential Czech customers. Moreover, the author mentioned two main threats limiting the automobile aftermarket customization business. Finally, the evaluation of automobile aftermarket modification was formed as well as the recommendation for the Czech market integration.

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ANNEX

Annex I: Interviews' template	1
Annex II: Original Mercedes-Benz S63 coupe vs. customized versions.....	5

Annex I: Interviews' template

Interviewees: Robert Lehner – Managing Director, Hamann GmbH. Laupheim.
Germany

Raphael Simon – *Supply manager for Poland, Czech Republic, and Slovakia* Brabus Group GmbH, Bottrop, Germany

Ondřej Polanský – *New automobile sales and AMG expert*, Mercedes-Benz Prague

Tomáš Kuba – *BMW new car sales*. BMW Invelt, Prague

Questions:

1. How can a customer individualize potential model according to his desires, even though a model is already offered as customized? Or is it possible to modify the automobile according to individual wishes of the customer only?
2. Does the customization company has an access to information about newly developed automobile - technical and styling layout, before a model is officially distributed by the auto manufacturer?
3. When the customization companies purchase the vehicle, in order to modify it for the final customer, in which condition the automobile is and how long the delivery time is? Does the company purchase each car separately; or rather buy more of them as a bundle.

4. How long the delivery of an automobile takes, after the customer purchase order has been sent?
5. Are the additional design accessories and technical components designed by a customization company or are they purchased from another supplier and assembled on the vehicle?
6. What is the estimated volume of sales, or at least which brands and models are mostly sold?
7. Who provides after sale service? Whether it can be done by the original manufacturer or by the customizer service only.

8. Which markets are perceived as the best? How do you perceive East European market, specifically Czech one?
9. Does customer know what he/she want to buy , or comes and decide during the decision making process? Does a customer use the opportunity to test drive, if available?
10. Which factor do you perceive as more important for purchase decision? The performance and handling of the vehicle, or its design look and comfort? Or do you think it is even?







11. What would you add, or change as the target segment characteristics? (to the table)

Demographic	25-55, mainly males, with high income, professionals
Geographic	Developed markets (western Europe)
Psychographic	Upper class, differentiation seeking, expressing status and position in the society, success, prestige, materialistic,
Behavioral	Ambitious, people willing to take risks, young thinking people, loyal (origin brand),

12. Up to which level the loyalty to the origin manufacturer plays the role?

13. Are customers willing use leasing or loan in order to buy customized automobile?

Annex II: Original Mercedes-Benz S63 coupe vs. customized versions

Customizer 1		Original Model	Customizer 2
Brabus 850 6.0 Biturbo		Mercedes-Benz S63 coupe	Mansory M1000 kit for Mercedes-Benz S63 coupe
			
			
Power	838 HP	585 HP	985 HP
Torque	1420 Nm	900Nm	1400 Nm
0-100 km/h	3,5 s	3,9 s	3,2 s
Top speed	350 km/h	250 km/h	300 km/h

Source: Author's own creation based on Brabus, Mercedes-Benz, Mansory webpages