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Re-alignment of German car producers in times of profound changes

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Master in Management

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BUSINESS
SCHOOL

Department of Marketing, Strategy and Operations

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Resumo

Esta investigação analisa e avalia as tendências macro-ambientais emergentes na indústria automóvel e o seu efeito evolutivo sobre a vantagem competitiva dos principais fabricantes de automóveis premium na Alemanha. Para responder a esta pergunta, são explorados os factores históricos fundamentais para o sucesso dos fabricantes alemães de automóveis. Além disso, são examinadas as prováveis competências nucleares e a vantagem competitiva resultante do futuro, a fim de propor novas estratégias de negócio para OEMs. Além disso, o impacto da COVID-19 sobre as empresas no âmbito desta tese representa um objecto de investigação.

A fim de responder adequadamente a estas questões, são realizadas entrevistas aprofundadas com cinco gestores de topo de OEMs alemães e são submetidos a uma análise de conteúdo. Além disso, a literatura académica e os relatórios empresariais são complementados para reflectir criticamente ambas as fontes de conhecimento e para obter uma visão holística sobre o tema. Também, a fim de clarificar as tendências actuais da indústria e do mercado, foram aplicadas as cinco forças de Porter e a análise PESTEL. Com base no resultado destes quadros, é realizada uma matriz de análise e de confrontação TOWS para se poder propor novas estratégias para as empresas subjacentes.

Os OEM devem esforçar-se por uma maior concentração no cliente e uma adaptabilidade subsequente mais rápida para a mudança das necessidades do cliente, que tornam possível através de um poder inovador ainda maior do que no passado. Isto permite aos OEM manterem-se à frente da dura concorrência da Ásia e da China e ajudá-los a vencer a corrida da sustentabilidade. Para criar estas competências centrais, os OEM são instados a envolverem-se em colaborações intersectoriais para evitar a ameaça de novos participantes, aumentando o poder inovador e assegurando uma vantagem competitiva sustentada. A forte pressão política, social, legal e ambiental para diminuir as emissões de CO2 precisa de ser rapidamente abordada através da produção de carros eléctricos, de uma maior optimização dos motores de combustão interna e da utilização de materiais leves.

Palavras-chave: Indústria Automóvel Alemã, Modelos Empresariais, Re-alinhamento Estratégico, Vantagem Competitiva, Tendências Automotivas
Código JEL: L62, O32

Abstract

This research analyzes and assesses emerging macro-environmental trends in the automotive industry and their evolutionary effect on the competitive advantage of major premium car manufacturers in Germany. To answer this question, the historical key drivers for the success of the German car makers are explored. Furthermore, the probable core competencies and the resulting competitive advantage of the future are examined in order to propose new business strategies for OEMs. Also, the impact of COVID-19 on the companies within the scope of this thesis represents a research object.

In order to anser these questions appropriately, in-depth interviews are conducted with five top-level managers from German OEMs and are subjected to a content-analysis. In addition to that, academic literature and business reports are supplemented to critically reflect both sources of knowledge and to get a holistic view on the topic. Also, in order to clarify current industry and market trends, Porter's five forces and the PESTEL analysis were applied. Building upon the outcome of these frameworks, a TOWS anlysis and Confrontation matrix are conducted to be able to propose new strategies for the underlying companies.

OEMs should strive for a stronger customer focus and a faster subsequent adaptability for changing customer needs which they make possible through a even higher innovative power than they had in the past. This enables OEMs to stay ahead of the stiff competition from Asia and China and help them to win the race of sustainability. To create these core competencies, OEMs are urged to engage cross-industry collaborations to avoid the threat of new entrants, increasing the innovative power and ensure sustained competitive advantage. The strong political, social, legal and environmental pressure to decrease CO2 emissions needs to be adressed quickly through the production of electric cars, further optimization of internal combustion engines and the use of lightweight materials.

Key words: German Automotive Industry, Business Models, Strategic Re-alignment, Competitive Advantage, Automotive Trends

JEL Code: L62, O32

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List of Abbreviations

BDI:	Bundesverband der Deutschen Industrie
BMW:	Bayerische Motor Werke
BOS:	Blue Ocean Strategy
BRIC:	Brazil, Russia, India, and China
CAD:	Computer-aided design
CAGR:	Compound annual growth rate
CPI:	Consumer price index
CRM:	Customer Relationship Management
DAT:	Deutsche Automobil Treuhand
DINKIES:	Double Income no Kids
EDGE:	Enhanced Data Rates for GSM Evolution
FAW:	First Automotive Work
GAZ:	Gorky Automobile Plant
GM:	General Motors
GPRS:	General Packet Radio Service
GSMA:	GSM Association
IAM:	Independent Aftermarket
ICE:	Internal Combustion Engines
IO:	Industrial Organization
IT:	Information technology
JISA:	Just-in-sequence
JIT:	Just-in-time

KSF:	Key success factor
LTE:	Long Term Evolution
MCC:	Micro Compact Car AG (today known as the Daimler AG brand 'Smart')
MMI:	Audi Multi Media Interface
NAFTA:	North American Free Trade Agreement
OECD:	Organization for Economic Cooperation and Development
OEM:	Original Equipment Manufacturer
OES:	Original Equipment Supplier
PPI:	Producer price index
R&D:	Research and Development
RBV:	Resource-Based View
SAIC:	Shanghai Automotive Industry
SVT:	Stolen Vehicle Tracking
UK:	United Kingdom
USB:	Universal Serial Bus
VDA:	Verband der Automobilindustrie
VW:	Volkswagen
WEF:	World Economic Forum
Wifi:	Wireless Fidelity

Chapter 1: Introduction

Traditional German car Original Equipment Manufacturer (OEMs) are at the beginning of a new automotive era because recent macro-environmental trends are affecting their existing business models heavily (Krätzig et al., 2019; Krzywdzinski, 2019).

Saturated markets like the European Union (EU) continue to decline in sales numbers, the world's most powerful companies in terms of resources are entering the automotive market through developing systems for autonomous driving and putting a lot of pressure on well-established OEMs (KPMG, 2019; Porter & Heppelmann, 2014; McKinsey & Company, 2014). Therefore technological innovation, which has historically been carried out by OEMs, is increasingly moving towards the suppliers' side (Krätzig et al., 2019).

Moreover, the ever increasing connected consumer expects their car to be a highly personalized extension of their daily and digitally connected lifes, without making any compromises in terms of a safe and reliable road performance (IBM, 2008, 2015; KPMG, 2019; McKinsey & Company, 2014). Also, fostered by shifting consumer preferences due to environmental and economic concerns, classical car ownership is expected to be increasingly replaced by new mobility solutions such as car-sharing, especially in urban areas (Berger, 2018; Bain & Company, 2018; Consulting4Drive, 2012; Deloitte, 2014; KPMG, 2019; Aboltins & Rivza, 2014). Simuateously, with the change in customer preferences, also political and legal factors forcing OEMs to to lower the carbon dioxide (CO2) emissions of their cars drastically throughout the next years (KPMG, 2019; Berger, 2017). This not only leads to the trend of e-mobility, but also the use of lightweight material and continuous optimization of the internal combustion engine (ICE) seems to be mandatory for OEMs in order to fulfill the applicable regulations and laws. Because of the fact that all of those trends require high investments in reseach and development (R&D), the trend of standardization of platforms and commodities arises to cushion the cost pressureres (KPMG, 2019; Schaeffler, 2012; World, 2012).

This situation has worsened especially since the outbreak of the coronavirus. Supply chains are broken, which is especially problematic if companies depend upon a network of international suppliers of auto parts and by mid-2020, the automotive companies worldwide had started to experience huge and sudden drops in sales numbers (Baldwin & Weder di Mauro, 2020; Bauer & Weber, 2020; Kucharski et al., 2020).

All of these trends and impacts are hitting the OEMs and lead to a revolutionary paradigm shift for well-established OEMs which are traditionally focusing on turnover generated primarily from car sales as a common practice (Dombrowski & Engel, 2013). A look at the numbers shows the extraordinary importance of OEMs for the German economy. Therefore, the automotive industry is the largest industry sector in Germany employing about 820.000 people and listing a turnover of EUR 420 billion in 2017. Automotive industry profits represent about 20% of total industry revenues in Germany (Statista, 2018a). With 5.12 million domestic produced vehicles in 2017, Germany after Japan, China and the U.S. is the fourth largest car producer in the world (Statista, 2018b). The worldwide production of vehicles from German manufacturers amounts to 16,4 million (VDA, 2018a). This gives an idea of what a collapse of the automotive industry in Germany would have for an impact on the whole country. Therefore, OEMs need to react quickly to changes occurring on a national or global level. They are forced to make changes by updating their technology, remodeling strategies or, in certain cases, even changing their business model (Krätzig et al., 2019). This thesis is intended to develop a solution for precicely this question.

The authors motivation for this topic also arises from that question. Since the writer worked more than one year for two German OEMs and having understood the actual market dynamics and their tremendous impacts with a potential risk of a disappearing of the automotive industry from Germany, this very important economical pillar for the whole country, this dissertation should help OEMs to clarify their strategies and win the challenges of the future.

Thus, the main research question posed in this dissertation is:

What are the effects of market dynamics on resources and capabilities of German premium car OEMs as drivers of competitive advantage?

To answer this question, three sub-questions are posed:

i. What have traditionally been the core competencies of the German OEMs in the past?
ii. What do the OEMs think/predict will be the core competencies of the future?
iii. How do the OEMs expect to keep their competitive advantage in the future considering the current mega trends and the events in terms of the pandemic?

The first sub-qestion should hereby enable a better knowledge about the reasons for the success of German OEMs in the past to be able to better understand the presence and define the future of them.

The second sub question, already relating to the core competencies of the future, should clarify current market and industry trends applying Porter's five forces and the PESTEL analysis. Building upon the results of the second research question, the third research question should already propose adjustments of the current strategies of OEMs through the appliance of the TOWS analysis as well as the Confrontation matrix. In addition to the frameworks in use, also academic literature, business reports and the results of the expert interviews will be intergrated in order to get a holistic view of the situation. Having answered the three sub questions, all information needed to answer the main question are provided appropriately.

By examining these issues through in-depth expert interviews from the viewpoint of top managers within these companies, it is hoped to get an insight into how OEMs are planning to master all the challenges mentioned in this section.

The rest of this dissertation is structured as follows: chapter 2 encompasses the literature review on the topic and is separated in a section with purely theoretical models about the topic and a section with data stemming from industry contextualization. Chapter 3 contains the methodology, chapter 4 covers the results and discussion and the last chapter presents the conclusion which should give practical managerial implications, limitations and suggestions for further research.

Chapter 2: Background Research

This chapter is intended to provide an overview of some of the relevant literature, useful for practical application throughout this dissertation. To do so, an overview about the topics of strategy, business model, resources and capabilities and cooperation-related topics is provided.

2.1. State of the Art

2.1.1 Business models overview

In the scientific literature, there has been no universal definition of the term business model (Hunter, 2020; Morris et al., 2005; Zott & Amit, 2010). Professionals and academics, however, agree that all successful companies need a thorough business model (Teece, 2010).

Developments in past years, such as the emergence of web-based business models, clarify why the majority of business model research comes through e-commerce (Hayes & Finnegan, 2005; Mahadevan, 2000; Osterwalder et al., 2005). In this situation, Mahadevan (2000) rescinds from concentrating on the internal elements of organizational core competencies and skills in his interpretation of the term business model, instead of emphasizing the company's external links in terms of revenue, value and logistics. In comparison, Davenport et al (2006) approach the term of the business model from an innovation viewpoint. The authors relied on the idea that a business model is the whole process of an organization to build and offer clear value to consumers and gain from that operation, as well as support its wider stakeholders (Amit & Zott, 2001).

As fragmented as the discussion on the meaning of the expression business model is, the identification of the distinctive elements of a business model is equally as diverse. Although no common ground has been identified yet, some ideas display a level of agreement with respect to the key components of a business model, as outlined below.

Zott et al (2011) classified the key elements of business models into three measurements: element definition which gives a good overview about the whole business, asset definition of capabilities and resources which shows what the company is able to do, and value proposition definition which shows what the value for the customer. Weill & Vitale (2001) also defined the common features of a business model as three elements, namely relationships, participants, and flows. More accurately, these terms belong to a company's interaction with its consumers, vendors, shareholders, and investors, as defined by the flows between them of tangible and intangible products. Hedman & Kalling (2003) proposed interlinked elements, involving market activities, firm resources and organization.

The description of business model´s elements by Hedman & Kalling (2003) incorporates strategic literature constructs, as the market analysis is related to the theory of Industrial Organization and Porter`s Five Forces Model, while company resources are linked to the resource-based view concept. Hereby, Porter's model of five forces is a framework to analyse the micro-environment of an industry to determine the competitive power and appeal to the market and consists of the analysis of the threats of new entrants, bargaining power of suppliers, threat of substitutes, bargaining power of customers and the competitive rivalry (Porter, 2008). The resource-based view concept will be explained more detailed in the next chapter

There are also several elements in the Shafer et al (2005) template that can be divided into four groups. The first section is called "strategic choices" which contains all the decisions made by the company. It is acknowledged that the components "creating value" and "capture value" are critical success factors in distinguishing the business from the competitors. To accommodate for the high importance of partnerships for the success of a business model, they have to be incorporated in a "value network".The following figure provides a detailed description of those four groups.

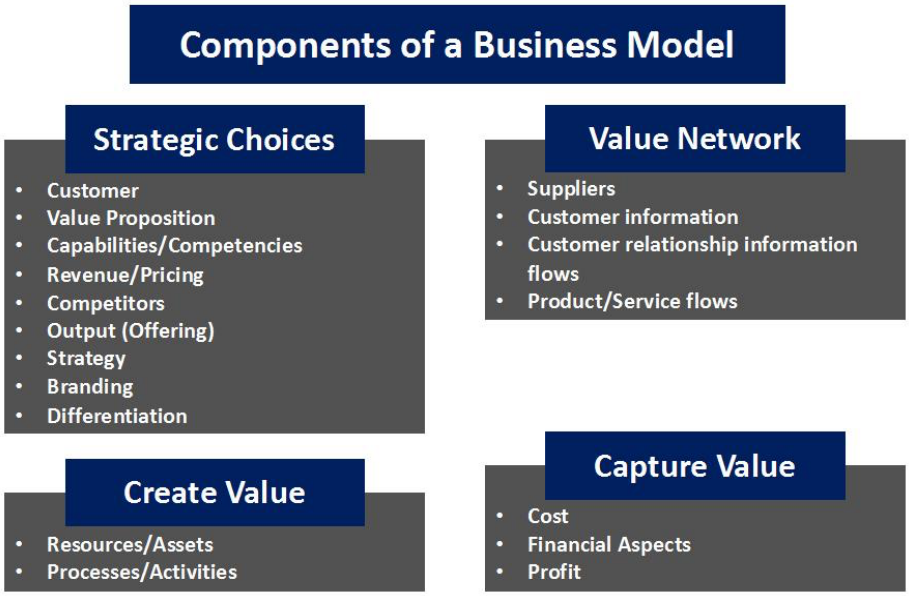

Figure 2.1: Business model concepts, adapted from Shafer et al (2005)

Osterwalder et al (2005) presented a slightly different approach to the categorization of business model components. Their framework consists of nine clusters, separated by four blocks: product, customer interface, management of infrastructure, and financial aspects. The figure below provides a picture of the individual clusters in these four blocks.

Pillar	Business Model Building Block	Description
Product	Value Proposition	Gives an overall view of a company‘s bundle of products and services
Customer Interface	Target Customer	Describes the segment of customers a company wants to offer value to
	Distribution Channel	Describes the various meand of the company to get in touch with customers
	Relationship	Explains the kind of links a company establishes between itself and its different customer segments
Infrastructure Management	Value Configuration	Describes the arrangements of activities and resources
	Core Competency	Outlines the competencies necessary to execute the company‘s business model
	Partner Network	Portrays the network of cooperative agreements with other companies necessary to efficiently offer value
Financial Aspects	Cost Structure	Sums up the monetary consequences of the means employed in the business model
	Revenue Model	Describes the way a company makes money through a variety of revenue flows

Figure 2.2: Nine business model building blocks, adapted from Osterwalder et al (2005)

2.1.2 The RBV and dynamic capabilities

The resource-based view (RBV) examines the potency of a firm to manage valuable resources to create competitive advantage (Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984). By displaying the company as a resource set, it is claimed that the resource heterogeneity distinguishes companies in their profitability (Ahmad, 2015; Andrews, 1987). Unlike market-based concepts of competitive advantage based on external factors (Bain, 1968; Lado et al., 1992; Porter, 1980), the resource-based view focuses on available resources within a company. As seen by Wernerfelt (1984) and Kostopoulos et al (2002), the sustained competitive advantage of a company depends on the nature of its resources and on its ability to organize and handle them internally.

Resources have to be heterogeneous and immobile in existence to obtain a long-term competitive advantage (Barney, 1991; Peteraf, 1993). This, in fact, equates into rare and valuable resources that cannot be completely imitated or easily replaced (Barney, 1991).

If these terms apply, the alignment of the company's resources is declared to produce sustainably superior returns. The following figure shows the structure developed by Barney (1991) for the assessment of resource conditions (VRIN).

Figure 2.3: VRIN framework, adapted from Barney (1991)

Later, this model got revised and adapted by Barney & Hesterly (2007). The “Non-Substitutability” got replaced by “Organization” so it is not the VRIN framework anymore but the VRIO framework.

Therefore, a sustainable resource or capability should be valuable what allows to seize opportunities or neutralizing threats, rare among the current and all potential competitors, hard to imitate and replace by the competitive cost as well as for a support through internal policies, processes and procedures as well as the organizational structure and incentives. If resources and capabilities have a strong degree in each of those four dimesions, they are a source of a sustained competitive advantage and can therefore lead to a well profit-earning potential of a resource or capability (Barney & Hesterly, 2007; Grant, 2010). Grant (2010) also presents an extended framework for appraising resources and capabilities. Through an assessment of the strategic importance and their relative strengths in comparison to the competition, this model enables to cluster different resources and capabilities by their relevance.

More lately, the dynamic capability theory (Teece et al., 1997; Eisenhardt & Martin, 2000) has broadened the RBV. Dynamic capabilities are referred to the competence of a company to produce, integrate, coordinate and adapt internal and external capabilities in terms of dealing with rapidly shifting environmental conditions. By creating this dynamic capability, a company can remain ahead of the competition and actually earn above-average profits (Teece et al., 1997). Therefore they are of very high importance for research and practical application. Against the backdrop of tremendous environmental changes, mostly in the context of an industry's technical transition, there are many historically profitable firms that are struggling to sustain their strategic edge, even though they have the essential tools to do so.

In the past, it was mainly the company's unique tools, expertise and core competencies that were decisive in order to attain competitive advantages, but today, against the context of an extremely uncertain climate, it is increasingly the diverse capacities, the early recognition of changes, the rapid adaptation of one's own resources to the changes and thus the renewed achievement (Waas, 2012). Dynamic capabilities are the opportunity to sende and then seize new prospects in order to gain sustainable competitive advantage, and to reconfigure and secure knowledge assets, competencies and complementary assets. Here if core resources and capabilities get blended, it can also emerge a compative advantage through co-specialization (Teece et al., 2007). The following figure illustrates the microfoundations of dynamic capabilities according to Teece et al. (2007).

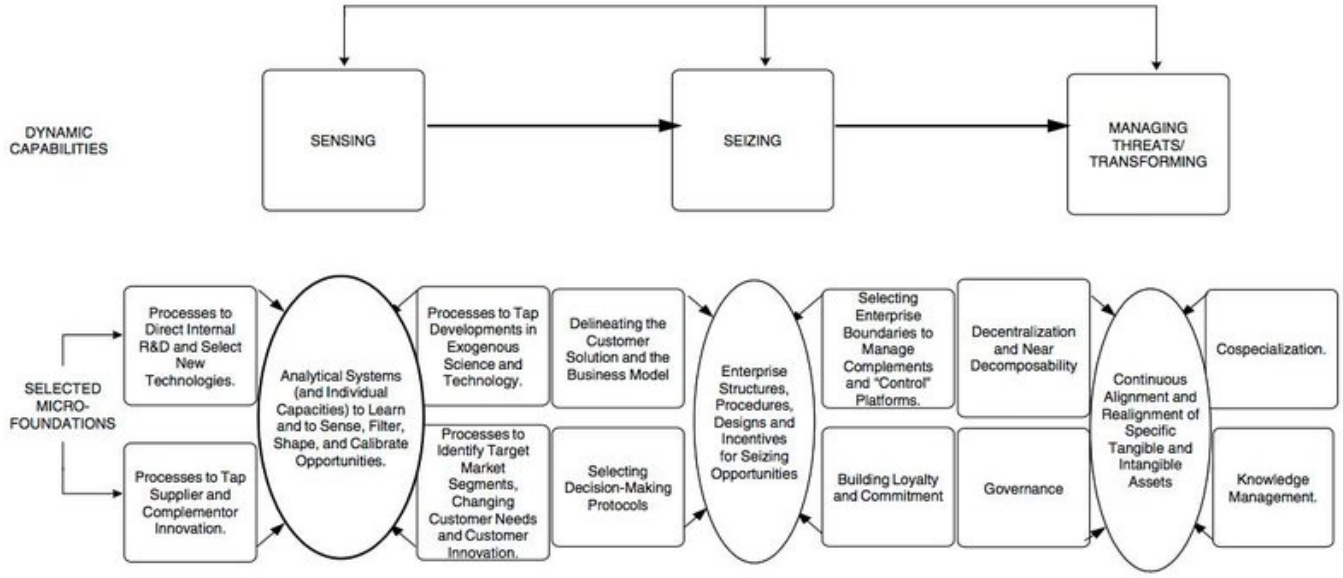

Figure 2.4: Foundations of dynamic capabilities and business performance (Teece et al., 2007)

The stage of “sensing” is characterized by assessing and identifying opportunities outside the current company. This involves not only R&D but also customer and competitive intelligence. In the next step, called “seizing”, is about mobilizing resources in order to capture value from such possibilities. Not only the creation of consumer solutions, but also the option of new business models and incentives. Here, the capacity for investment decisions is key. In the final stage “Managing threats or transforming”, it is about continuous renewal with the key success factors of organizational decentralization, governance and incentives, as well as knowledge management. (Teece et al., 2007).

Das & Teng (2000) categorized collaborative motivations through the transaction-cost theory and resource-based view lens. With regard to the concept of transaction-cost theory, managerial decision-making aims to minimize transaction costs, so inter-company collaboration is favored when the transaction costs associated with maintaining these interactions are not big enough to justify vertical integration (Gulati, 1998).

The intentions for inter-organizational cooperation in contexts of the resource-based concept arises out of the need to gain competitive advantage by incorporating valuable resources with other businesses. Particularly, it occurs at the time when the mergers or acquisitions cannot successfully leverage these resources or it is just to costly or takes to much time to develop those resources and capabilities. Gulati (1998) also hypothesizes on the logic of transaction-cost and amends it with incentives to strengthen the competitive position and gain new expertise. Because this dissertation concentrates on inter-company partnership as a means of accessing innovations and know-how to address the shifting automotive environment, the focus of the study is on resources rather than costs.

2.1.3 Business model and business strategy

An overview of the differences between major theoreticians demonstrates that two major research streams formed the terms around the phrase business strategy. One perspective on business strategy emphasizes contextual or environmental evaluation of a company's position on the market. While the second stream relates to the resources and the effective use of it from a company (Kostopoulos et al., 2002; Bracker, 1980). The first channel, that basically considers the opportunities and threats of a company is based on the economics of industrial organization (IO) which assumes that the underlying causes of performance of a business are attributed primarily to its external conditions (Shepherd et al., 2003; Kong, 2008) . As main factors of progress, the second stream of business strategy focuses on organizational resources and capabilities. This channel was later referred to as the Resource Based View (RBV) (Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984; Kong, 2008). Nevertheless, Teece (2010) argues that "Business model" and “strategy” are among the words that are used most sloppily in business today. Nonetheless, the researchers which reflect the relationships and interrelationships between business models and strategy can be divided in two groups: Those who advocate a clear division of the two principles, and those who agree with the interpretation of Hedman & Kalling (2003) that the business model is not separated from the strategy, but rather galvanizes the very key elements of the strategy. Seddon et al (2004) described five different ideas on the similarity between the two concepts in their analysis of scientific literature on the relationship between the business model theory and strategy. The figure below shows the possible overlaps between strategy and business models according to Seddon et al. (2004). According to the researchers, a business model can be party incorporated int the strategy (A) or vice versa (B) or the strategy can be exactly the same like the business model (C) or the business model can be completely incorporated in the Strategy (D) or vice versa (E).

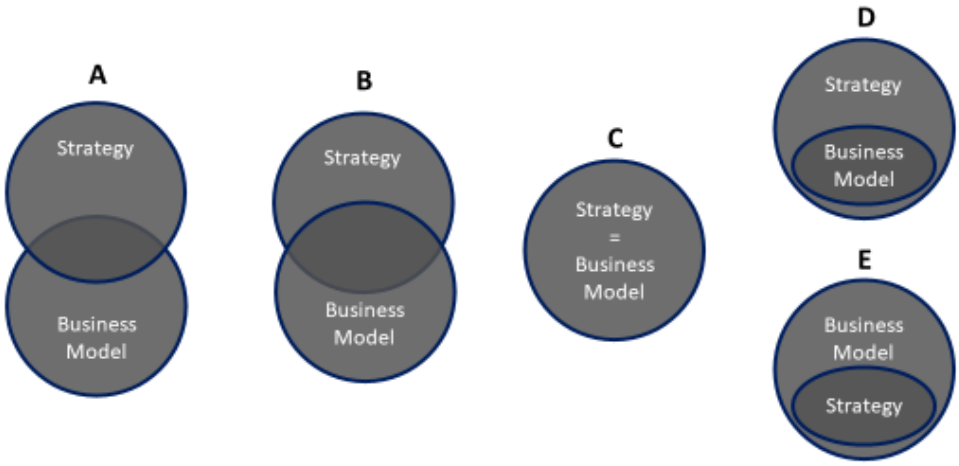

Figure 2.5.: Possible overlap between the concept's strategy and business model (Seddon et al., 2004)

In their attempt to explain more accurate perspective among them, the authors conclude that "a business model outlines the essential details of a company's value proposition for its various stakeholders and the business system that the firm uses to create and deliver value to its customers" (Seddon et al., 2004, p. 14). According to Porter et al (2001), business model can be defined as an abstract representation of some part of the strategy of a company. Unlike strategy, however, business models do not consider a competitive positioning of a company (Seddon et al., 2004).

This perspective is compatible with other work in the area, like Magretta (2002), who also claims that the aspect of competition is the resolute component which distinguishes strategy from the concept of the business model. Therefore, different firms can use equivalent business models. In order to distinguish themselves from competitors, they will have to add different strategies to their business models in terms of consumers, markets, goods, services, or value delivery. Therefore, both definitions are clearly linked, yet they are distinct from each other. Shafer et al (2005) argued that the business model is a reflection of the approach of an organization, as it represents the strategic decisions taken and the practical implications of them.

Zott & Amit (2008) considered the business model as a generator of value that is connected to the the general strategy of the company's product market and considers the two differenct concepts more like cmoplements which can have a strong impact on the performance of the company then the business model is deeply integrated in the strategy. Therefore, they view strategy and business model more like a complents, instead of substiutes.

Given Magretta (2002), Shafer et al (2005) and Amit & Zott (2008) findings, this dissertation explores the business model theory as an integration of different strategic perspectives.

In conjunction with the the exploration of different perspectives of high-ranked automotive managers as well as the extensive research of current market data und business reports, this thesis suggests strategic alternatives for the future re-calibration of OEMs employs the business model approach of Osterwalder et al (2005).

2.1.4 Strategic collaborations

Numerous approaches are discussed in the literature, regarding the rationale of the emergence of cooperation (Hake & Vukelich, 1972; Knoblich, 1969; Koço & Capponi, 2011). The transaction cost theory is essentially based on the thoughts of Coase (1993), who posed the question of why transactions are not coordinated completely by markets, but partly by companies. The reason for this is the so-called transaction costs. In particular, the risk of opportunistic behavior by transactional partners or the measures that have to be taken to prevent it (control, sanctions, etc.) have an effect on the level of transaction costs. Opportunistic behavior is possible whenever the degree of uncertainty in a transaction is very high or when the transaction has a very high specificity. In this case, hierarchical coordination is preferred to market ones (Coase, 1993).

In contrast to the RBV, the technique to transaction cost theory presents costs as the base unit of assessment instead of the RBV which examines the potency of a firm to manage valuable resources to create competitive advantage (Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984).

Intercompany cooperation appears in various forms. The differentiation of these different forms can be carried out according to different criteria (Hake & Vukelich, 1972; Knoblich, 1969; Koço & Capponi, 2011). Knoblich (1969) differentiates between three essential criteria: the direction of cooperation, the intensity of cooperation and the areas of cooperation.

Relative to the direction of cooperation, it is possible to distinguish them between horizontal, vertical and diagonal. In the case of horizontal cooperation, cooperation between companies takes place at the same value-added stage. Hamel and colleagues coined the term Competitive Collaboration in 1989 to represent this form of cooperation (Hamel, 1989). Examples of this form of cooperation would be two logistics service providers, each of which specializes in certain transport businesses and complement each other in their range of services, or two printers who work together to utilize their production facilities (Stephan & Herzog, 1998). In the German automotive industry, there is a high number of examples for that case. For instance, the Daimler AG cooperates with Renault to develop a new, shared platform and new engines.

Also, the Daimler AG cooperates with the BMW Group in the fields of procurement and development as well as they plan to cooperate in the area of shared mobility and autonomous driving (Handelsblat, 2019a). In addition to that, almost every German OEM has Chinese OEMs as an important cooperation partner to expand their businesses in China (Manager Magazin, 2018b). All these examples of cooperation reflects horizontal cooperation.

Vertically, the companies that belong to different value-added stages cooperate, so the cooperating companies are actually in a classic supplier-customer relationship. In this case, the logistics service provider would work with the mail order company or the printing house with a photo studio (Stephan & Herzog, 1998). Also, in the automotive industry, good examples can be found. Here, the customer (the car manufacturer) is very involved in the development of parts of its suppliers, which are practically integrated into its value chain. The Daimler AG set up a cooperation with the battery supplier Sila-Nanotechnologies, the BMW Group with China«s largest manufacturer of batteries CATL and the VW AG with the Swedish start-up Northvolt (Daimler, 2019b; Handelsblat, 2019b; Manager Magazin, 2018a). The vertical cooperation of OEMs with contract manufacturers like Daimler with Magna Steyr or VW with the Wilhelm Karmann GmbH are counting to the more classical ones.

If the companies belong to different industries, they cooperate diagonally or in a complementary way. Such a form of cooperation aims to create new products and services in which new technologies or market fields are processed (Wei et al., 2014). Diagonal networks connect different value chains (Corsten, 2001). Cooperation with general partners was intensively discussed for the first time by Nalebuff & Brandenburger who developed the topic of “coopetition” regards the complementary partner as an additional competitive force alongside its suppliers, competitors and customers. It defines both the state and the actions of the (economic) players under which a partnership correlates with cooperation and competition. (Nalebuff & Brandenburger, 1996). Current cooperation examples could be the cooperation between the BMW Group, the chip producer Intel and the specialist for camera technology Mobileye. In that case, Intel and Mobileye do not belong to the automotive industry yet but due to the need of developing autonomous driving cars, OEMs set up cross-industry cooperation with them to get the know-how of the technologies that are needed to build an autonomous driving car. This makes them to complementors. On the other hand, those partners could also become competitors to the BMW Group (BMW Group, 2017; KPMG, 2019b).

The following figure summarizes the possible directions of cooperation modified from (Albers, 2000).

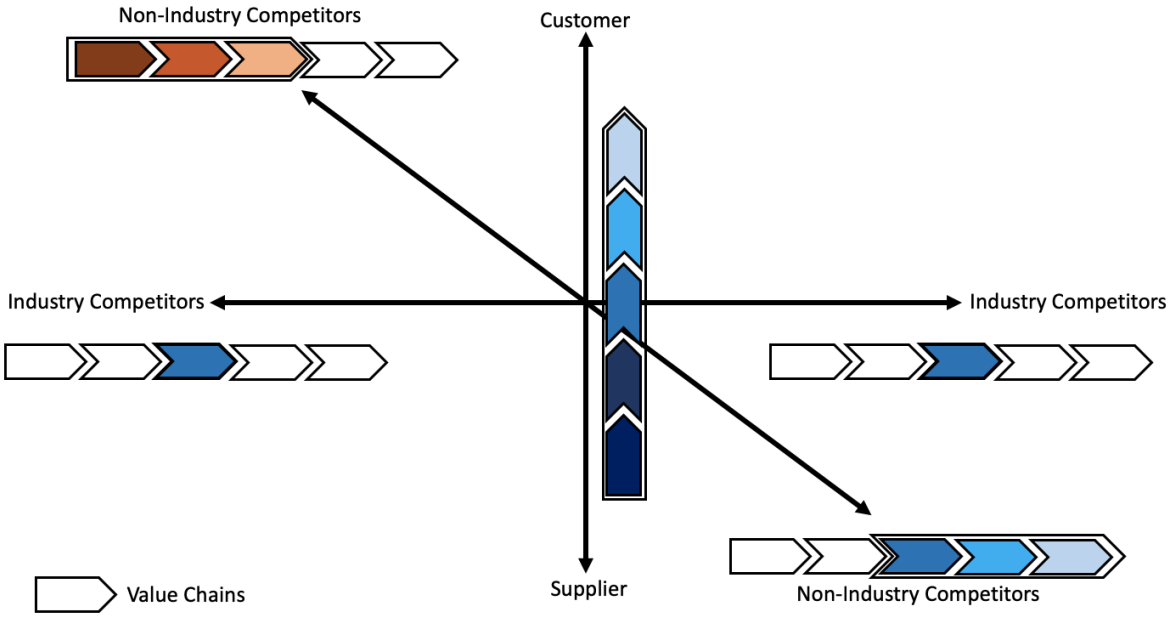

Figure 2.6. Direction of partnerships modified according to Albers (2000)

In addition to the direction of a cooperation, it is also possible to distinguish them by their model. There are a lot of special, mixed forms of cooperation but in order to fulfill the scope of this dissertation, a closer look at the main types – joint ventures, strategic alliances and corporate networks is completely adequate.

A joint venture describes an arrangement between two or more parties which agree to pool their resources for the purpose of accomplishing together a specific task (Kraege, 1997). This implies that the cooperation considers the long-term horizon, if not permanent, and is not limited in time. With regard to the direction of cooperation, there are no previous conclusions in the literature, hence, joint ventures can be based on horizontal as well as vertical or diagonal cooperation. The number of cooperation partners seldom exceeds four to five (Kraege, 1997). The involved companies can accept total organizational interdependence or jointly perform some of the functions such as R&D, manufacturing, procurement, distribution, marketing and so on. Due to flexibility, allowed by joint ventures, it is broadly applied by companies to reposition themselves in existing markets or targeting new ones (Hagedoorn, 1996).

The OEMs are now collaborating on a wide range of projects for versatile motives. As an example of strategic importance of partnerships, it is important to consider a joint venture among the Volkswagen Group and Chinese automakers SAIC, FAW, since the end of 2017. Also, FAW allowed VW to outperform all competitors of the Chinese market share (Manager Magazin, 2018c).

Also, for Daimler, their joint ventures in China with BAIC, BYD and Geely are strategically very important because China became the most important market for German OEMs (Manager Magazin, 2018c). OEMs also team up with suppliers with the purpose to develop new lightweight materials. It is similar to the Daimler's deal with Japanese carbon fiber specialist Toray, and BMW's arrangement with SGL Carbon to jointly develop new materials that will improve vehicle's fuel efficiency and emissions (BMW Group, 2017; Toray, 2011).

However recent studies show that joint ventures are losing popularity overwhelmingly due to the high organizational costs, combined with a high risk of failure (Bidgoli, 2010; Buchmann & Pyka, 2015). More specifically, the challenges to joint ventures stem from reluctance to share proprietary knowledge, non-equity in control, and contradictory objectives of the alliance members.

In contrast to a joint venture, a strategic alliance is an agreement between two or more companies to cooperate in specific business activities so that each benefit from each other's strengths and gains competitive advantage (Hess, 2002). They work together but they do not set up a completely new company together like in the case of a joint venture. They stay two different legal entities. Many authors argue that the cooperation of the partners relates to a very specific business field. However, a business-related cooperation is only possible between current or potential competitors, so that strategic alliances are necessarily horizontal cooperation (Albers, 2000; Backhaus, 1990; Hess, 2002). Other authors, however, state that it is not necessarily the goal of alliance partners to achieve competitive advantages in one and the same business area (Albers, 2000; Krieger, 2001) so that such cooperation could also be vertical or horizontal. Since a business area is defined by customers or markets as well as by the technologies used, it seems logical that a cooperation that would relate to a specific business area, would be of a horizontal nature. With regard to scope of a strategic alliance, Hess (2002) stated that strategic alliances are limited because they are dedicated to one specific task and are more of a project nature. There are also two different forms of such alliances: equity alliances and non-equity alliances. Equity alliances are hereby defined through an buyage of a certain perfectage of the other campany which would form an alliance. In contrast to that, non-equity alliances are created through a relationship to pool resources and capabilities together (Krieger, 2001). However, the limitation of cooperation to one thing implies a time limit, which will, however, generally be of medium to long-term nature (Albers, 2000; Krieger, 2001).

To sum up, this section provided a holisitic view about the topics of strategy, business models, resources and capabilities and inter-firm collaborations. In the further performance of this dissertation, special attention will ge given to the topics of strategy, collaborations and resources and capabilities as well as the connection between them will be shown in a practical way.

2.2 State of the practice

In order to give an overview of the present setting of the German automotive industry, this context chapter outlines past and recent market developments including a brief discussion of specific characteristics of the automotive industry in this geographical region. Moreover, the market fragmentation of major German OEMs is investigated. Due to the spreading of COVID-19 during the development of this dissertation, this topic is also part of the investigation in the given scope.

2.2.1 Industry summary and key players

The automotive industry is the largest industry sector in Germany employing about 820.000 people and listing a turnover of EUR 420 billion in 2017. Automotive industry profits represent about 20% of total industry revenues in Germany (Statista, 2018a). The German automotive industry has performed well in recent years internationally. In the world's major car markets like western Europe and the Asia pacific, German companies were able to increase their shares of the respective car sales throughout the years from the crisis in 2008 until 2012. The vehicles of German brands by now pertain to the world leaders in terms of safety, performance, comfort, variety, design, reliability and image (Deutsche Bank, 2014).

With 5.12 million domestic produced vehicles in 2017, Germany after Japan, China and the U.S. is the fourth largest car producer in the world (Statista, 2018b). The worldwide production of vehicles from German manufacturers amounts to 16,4 million (VDA, 2018a).

While foreign car producers mainly serve their domestic markets, around 77 percent of the German car production goes abroad, turning Germany into the world's largest passenger car exporter (World`s Top Exports, 2019; VDA, 2018b). The German automotive industry has been expanding their production and R&D capacities abroad (Deutsche Bank, 2014) that increased the German car production and sales volume. However, domestic sales rather stagnated (though on a high level) on the long-term trend (Figure below).

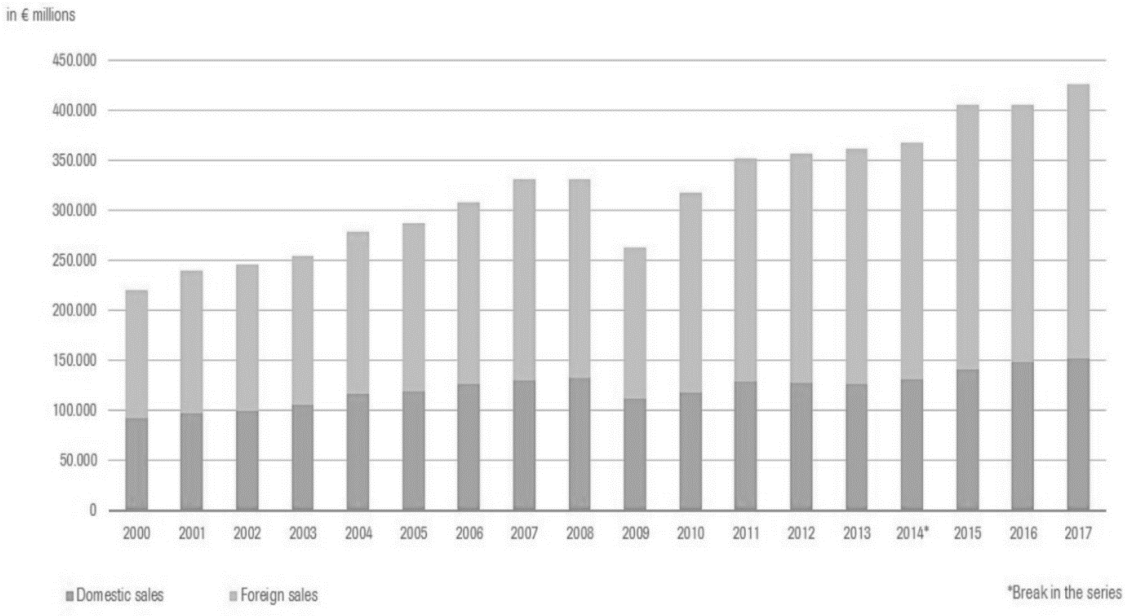

Figure 2.7. Domestic and foreign sales in the German automotive industry (VDA, 2018c)

In addition to the sales numbers, the quantity of the production also seems important. In 2017, the German car production reached over 10.8 million units and in 2013 over 8.6 million units abroad (VDA, 2018a). Since 1998, except for 2009 (in the aftermath of the Global Financial Crisis), the passenger car production in Germany always totaled more than 5 million units. It is striking that the opening of the gap between domestic and foreign production accelerated especially in the years 2010 to 2012. By 2013 already foreign manufacturing was almost 59% higher than domestic car production. Hence, after the crisis in 2009, the German automotive industry drastically increased production capacities in foreign locations. This is especially true for China, but also in the NAFTA region new production facilities were opened up and existing ones were extended (VDA, 2018c).

Regarding the market fragmentation of the German automotive industry and reflecting the new car registrations by manufacturing countries, the German car market is clearly dominated by domestic manufacturers. In 2017, the market share of German manufacturers amounted to 70.9 percent and fell down from 71.9 percent a year earlier. Therefore, the loss of 1 percent of market share to foreign brands was recorded. French brands were able to strengthen their market share in 2017 as compared to their market share in 2016, that was about 14 percent. Korean manufacturers had 3 percent, Italian brands had up to 11 percent and Japanese brands possessed up to 5 percent (VDA, 2019).

Through investigating the market shares of German car manufacturers by comparing the brands' annual sales volume on a global scale in 2018 the following figure confirms, Volkswagen` sales reached 6.21 million in 2018 and is therefore the biggest German car producer.

On the second ranked, however was Mercedes with over 2.3 million cars sold in front of BMW with 2.1 cars sold in 2018 (BMW Group, 2019; Daimler, 2019a; Spiegel, 2019a).

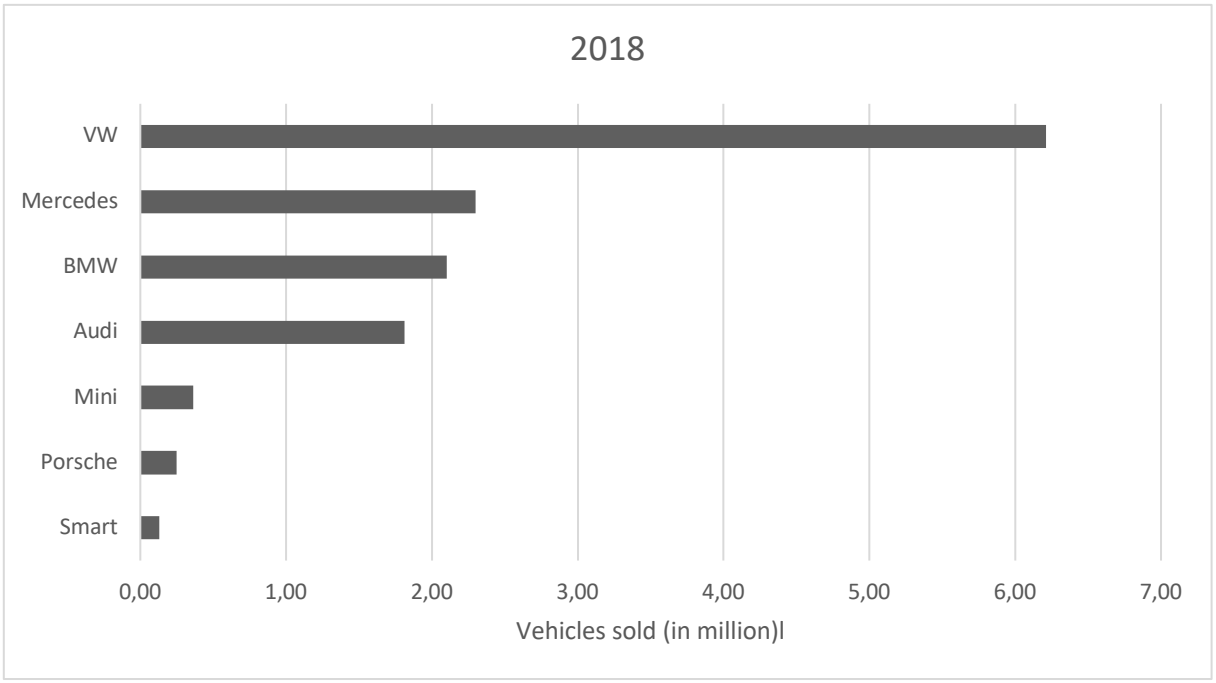

Figure 2.8.: Market fragmentation of German OEMs by sales volume worldwide (BMW Group, 2019; Daimler, 2019b; Spiegel, 2019a; Statista, 2019)

2.2.2 Model of the supply and value chain

Germany's outstanding automotive industry value chain can be seen as a decisive factor of success . No other country in Europe disposes of a comparable concentration of auto related infrastructure including R&D, design, supply, manufacturing, and assembly facilities. Specifically, Germany's automotive industry can be clustered into four stages presenting a vertical value-added chain (Diez, 2005).

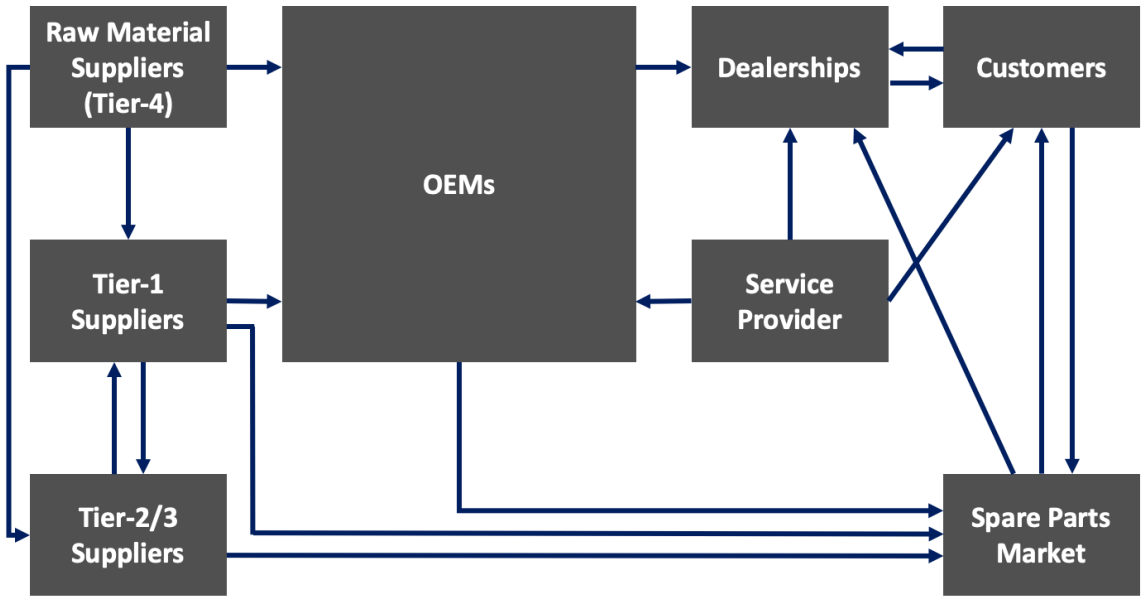

Figure 2.9.: Germany's automotive value chain (Dicken, 2007; Gaughan, 2010; Peng et al., 2009; Sierzchula et al., 2012)

The first stage consists of suppliers of raw material and components. The 1st (top) tier suppliers supply non-standard, differentiated key component systems such as electric systems, steering wheels, and car seats direct to the manufacturers and possess significant R&D and design expertise (Dicken, 2007; Gaughan, 2010; Peng et al., 2009). Second tier suppliers generally produce to design provided by the manufacturers or by the top tier suppliers. They can be differentiated into two groups: Original Equipment Suppliers (OES), supplying manufacturers and retailers with parts and components branded as OEM-specific; and Independent Aftermarket (IAM) suppliers, producing goods for the independent automotive aftermarket. Third tier suppliers, in contrast, make the standard and undifferentiated basic components like commodity products such as belt buckles, cup holders, or simply nuts and bolts (Dicken, 2007; Gaughan, 2010; Peng et al., 2009). Finally, tier 4 suppliers provide industry members with the most basic materials required for interior and exterior respectively.

While first and second tier suppliers can be seen as direct suppliers producing automobile specific components, third and fourth tier suppliers are classified as non-direct suppliers acting more like pre-suppliers and producing non-specific goods like plastic and steel. The second stage of the German automotive value chain consists of automobile manufactures referred to as OEMs (Original Equipment Manufacturers). Moreover, OEMs also occupy the role of marketing and system leaders since they control technological developments and execute marketing activities (Sierzchula et al., 2012). As a third stage in the value chain, motor vehicle trade involving companies such as dealerships and workshops that take care of distribution, maintenance and after-sales service of automobiles come into play. Finally, the last stage of the German automotive industry value chain is presented by the customer who relates to dealerships and workshops for vehicle sales, maintenance and after-sales service.

Due to technological developments such as the advances in e-mobility and the emergence of connected cars, also formerly non-automotive industry sectors such as the telecommunication and the chemical industry become suppliers of products and know-how. An current example is cooperation between Audi and Apple to develop infotainment systems for the Audi brand (GSMA, 2013).

The impact of such trends on the overall development of the German automotive industry's value creation processes will be further analyzed during this study.

2.2.3 Future trends

According to recent studies (Berger, 2018; Bain & Company, 2018; Consulting4Drive, 2012; Deloitte, 2014; KPMG, 2019; McKinsey & Company, 2014; PwC, 2018), the automotive industry is forecasted to experience profound changes within the next years. Development of the macro-environmental trends hinge on the technological advancements, volatile consumer expectations, the rising economic power of emerging markets as well as the intensification of environmental regulations. It will have an ever-increasing impact on the German automotive industry and their business model. The following figure provides a visual overview of the individual automotive trends that are currently re-shaping industrial structures.

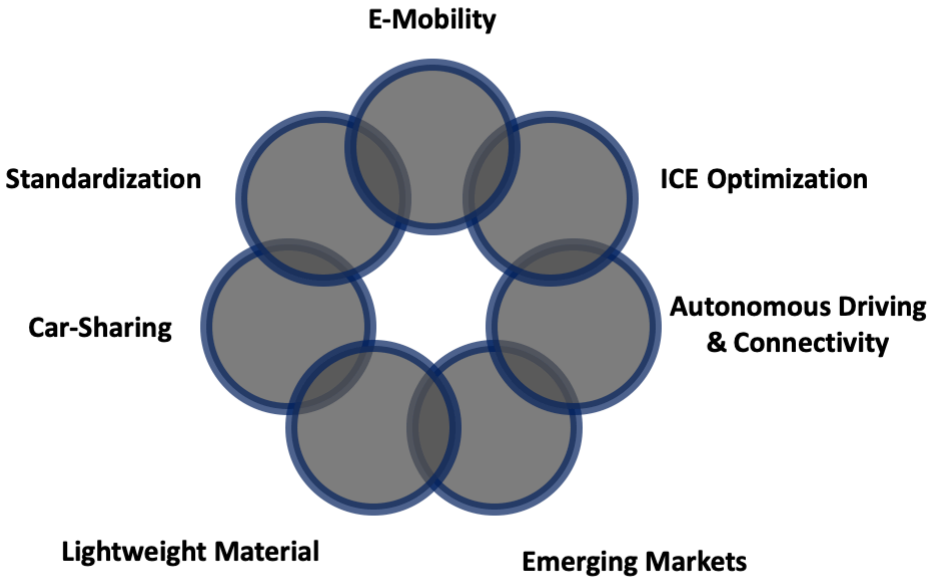

Figure 2.10.: Megatrends in the German car industry

One of the most important trends is the rise of connectivity and digitalization (Berger, 2018; KPMG, 2019). In today`s internet era, there is a change in demand of an increasingly connected consumer. For instance, the connected car is the third fastest growing technological device after phones and tablets.

While expecting safe and reliable road performance, consumers nowadays increasingly view the car as a highly personalized extension of their daily and digitally connected lives. The mega trend of an increasingly connected car is expected to require OEMs to closely collaborate with car dealers, technology and telecommunication companies. It also requires enabling other providers to offer necessary technologies and gather and analyze huge amounts of user data (IBM, 2008, 2015; KPMG, 2019; McKinsey & Company, 2014). Hence, the success in building brand loyalty and generating sustainable income streams for the future is expected to be determined by the firm's ability to capitalize on customer data.

Traditional automotive markets are increasingly saturated and continue to decline, while emerging nations such as Brazil, Russia, India and China (BRIC) offer the best chances for expansion. Thereby, the BRIC countries with the main growth driver China were estimated to account for 42% of annual global vehicle sales in 2019 (KPMG, 2019; McKinsey & Company, 2014).

Fostered by shifting consumer preferences due to environmental and economic concerns, classical car ownership is expected to be increasingly replaced by new mobility solutions such as car-sharing (Berger, 2018; Bain & Company, 2018; Consulting4Drive, 2012; Deloitte, 2014; KPMG, 2019). Particularly for the more established automotive markets, the trend of new mobility concepts is forecasted to deliver essential profits in the near future (Aboltins & Rivza, 2014). This is especially true for the densely populated urban areas, where space is rare.

Another global trend was ranked that constitutes the standardization of modules and the use of common platforms (Berger, 2018; KPMG, 2019). In this context, a platform refers to a technical basis for automobiles on which different models are built externally. These include sheet metal body parts. The platform can be used to assemble technical components such as the engine or gearbox from a modular system so that individual technical developments can be used in several models. This reduces development costs per model.

The efforts of automotive manufacturers to improve efficiencies and reduce costs, associated with the development of innovative products are increasing. Therefore, the trend towards the standardization of modules that enable production on a smaller number of platforms is taking shape.

While benefiting from substantial cost reductions caused by better scale economies, OEMs could maintain highly diversified product portfolios. Inaugurated by environmental concerns along with high fuel prices, the trend of downsizing the internal combustion engines (ICE) is developing (KPMG, 2019; Schaeffler, 2012; World, 2012). While the matter of reductions of CO_2 emissions have acquired greater importance in form of stringent governmental regulations and rising environmental awareness of consumers, the trend towards ICE downsizing and optimizing are further boosted by the failure of electric battery technology, aiming to produce cost-effective alternatives.

In order to reduce operating costs by further increasing the energy efficiency of vehicles, the improvement and development of lightweight materials is perceived as a major automotive trend (Magna, 2017; McKinsey & Company, 2018). Innovation in materials may strengthen further innovation in design and manufacturing techniques, forcing OEMs to closer cooperate with suppliers. By using new forms of material, the OEMs are expected to increase its market share in the lightweight industry from 30 up to 70 percent by 2030 (McKinsey & Company, 2019).

As an even greener alternative to ICE downsizing and optimization, e-vehicles are perceived as another emerging trend (Berger, 2018; KPMG, 2019; Schaeffler, 2012). However, high costs of acquisition, limited driving range, an insufficient coverage of recharging stations, and insecurities on battery longevity are the greater resisting elements for customer adoption that are impeding e-mobility in offering a real alternative to traditional cars. Regardless of the challenges, e-mobility is expected to play a superior role in all major future-markets. That is the reason why Smart which belongs to the Daimler AG will only produce electric cars from 2020 (Spiegel, 2019b). Given constant technological advancements, e-vehicles are anticipated to have a strong growth rate (PwC, 2018).

Another key trend is autonomous driving which is strongly related to connectivity. It is not just about new technology in the vehicle. These future trends will have a deep impact on the existing fundamental understanding and paradigm of mobility and will change the mobility behavior. They allow quantum leaps of a more efficient vehicle use (e.g., higher utilization of networked robo-taxis) and may significantly reduce mobility costs (mobility efficiency revolution). Simultaneously, they also expand the mobility options by bringing new technology uses of driving time in autonomous driving, networked vehicle allowed. In addition, for the change in combination with mobility services, the business models of the automotive industry are fundamental (McKinsey & Company, 2018).

Guided by the above ranking of the most popular car brands in Germany in terms of market concentration in 2017, our units for analysis are the German premium OEMs BMW Group, Daimler AG and the Audi AG. Although, they also operate on the German market, the Opel and Ford brand got excluded from the analysis. The rationale behind this exclusion is as both the firms belong to foreign (French and US) companies and are thus not operate in different business environments. Although Smart has a comparatively small possession share, it is important to include the brand in this analysis as it plays a vital role in Daimler's car-sharing and e-mobility concept. Also, Daimler uses only Smarts for its shared-mobility company and it will commence from 2020. However, Smarts will only get produced as fully electric vehicles (Spiegel, 2019a).

2.2.4 COVID-19 and the impact on the German automotive industry

COVID-19 has affected various economic sectors in several ways across the globe. The pandemic effects on the automotive sector have been manifested in two main ways: staffing and supply chain. As Nicola et al (2020) found, staffing deficiencies have been a relentless concern since the illness outbreak in multiple regions. Businesses have experienced a disruption in the supply chain as governments continue to enforce self-isolation and limited imports and export policies (Aylor et al., 2020). While the "working from home" concept has proved to be an effective solution in many industries, it is highly unviable in the manufacturing sector, given its nature since manufacturers vehemently rely on human resources in various areas of the production and supply chain.

Lastly, COVID-19 has affected all industries within the tertiary sectors across the globe. However, it is worth mentioning that these levels may vary across nations due to the differences in economic composition and power. Nicola et al (2020) postulated that the education, finance, healthcare, and transportation sectors are the main tertiary (service) sectors most affected by the pandemic due to the interconnectivity of industries today.

Research also exists already on the impacts of COVID-19's prevalence on the German automobile industry (Baldwin & Weder di Mauro, 2020; Bauer & Weber, 2020; Kucharski et al., 2020). While these effects stem from the impacts on the global economy as a whole, there also exist consequences that are particular to Germany's important automobile sector, contributing significantly to the European industry. Bauer & Weber (2020) found that multiple sectors in the broad transportation industry closed fully, resulting in a significant decline in the country's automobile industry's outflow. By mid-2020, the automotive companies worldwide had started experiencing a considerable reduction in the sales emanating from the deteriorating transport sector (Bauer & Weber, 2020). The demand for cars was halted by introducing transportation restrictions in the country and Europe as a whole. Bauer & Weber (2020) also link the pandemic to a sudden fall in the supply of the automotive sector components. German companies like BMW depend upon a network of local and international suppliers of auto parts. The various bans affecting international and national trade limited such auto parts even before international organizations could officially mark the pandemic as a global threat.

Fundamentally, the European automotive sector's globalization proved to be a challenge in moderating the impacts of COVID-19 on German manufacturers and distributors. The continued trade internationalization had not necessarily a positive aspect to embrace. Germany and other European Union (EU) countries value international integration of various components of the trade. The COVID-19 pandemic disoriented the regional business landscape, which demanded urgent de-globalization measures to save the declining automotive sector (Williams & Kayaoglu, 2020). Such actions included establishing a self-sustaining local industry, while limiting the exportation of automobile components.

The de-globalization wave was felt across the globe within the first few months of the pandemic and was seen as a vital way of acting proactively and resuscitating the declining industries and segments. Williams & Kayaoglu (2020) argue that these effects are more severe in European countries than in other parts of the world, given the lack of strong regional bases of operations. Notably, while Germany is one of the leading players in the global automotive industry, the country has embarked on remarkable globalization efforts, thereby leading to an overreliance on other countries for supplies.

Another initial critical predisposition of the pandemic that affected the German automobile industry is the regional disparity in the prevalence of the illness across Europe. Bauer & Weber (2020) postulated that the resultant disruption to Italy's automobile industry was an opportunity to understand the relationship between the country and Germany's automobile manufacturers. It also permits the elucidation of Italian auto parts suppliers' centrality in the broad German automotive industry. As Bauer & Weber (2020) asserted, the virus helped in determining an absolute dependence of the Italian auto parts industry on the expanded German market. EU is a crucial driver of the interlink within the European automobile industry; the virus's effects were thus spread across the region. While Germany had earlier instituted several safeguards to ensure continuity, the forthcoming impacts on neighboring countries would later paralyze the country’s automotive sector.

On the company leven, Handling the new challenges amid the turmoil experienced by the company is difficult and costly. Daimler interrupted its operations in March, following a rapid spread of the pandemic in Germany, and by April, almost all processes stopped. The company's measures were in line with the new stipulations proposed by the government on social distancing. A considerable part of the undertakings stopped, included basic operations in the car assembly units and supplies. Daimler's management opted for a "work-from-home," approach which could only help in managerial tasks.

Other companies such as BMW also reported an estimated deficiency in technological deployments for crucial launches in the country and globally. The delays created by COVID-19 are thus detrimental to the plans made in 2020 and launched for 2021 and the subsequent years. Fechner (2020) posited that a drastic change in strategic development poses two main problems: the opportunity cost of developing a new timeline and costs associated with adjusting to the new timeframe. Principally, the companies are under pressure of revising their timelines to adapt to the existing condition. While such an option seems plausible in most cases, multinationals' strategic plans can be overwhelmingly inflexible. In effect, it may take a while to adjust and implement the new timelines without suffering losses.

Additionally, shifts in business models are projected to be a long-term impact of COVID-19 on most multinationals, including automobile organizations. Expectedly, organizations are modifying their existing models to accommodate the involuntary change imposed by the pandemic regulations.

Seetharaman (2020) argued that these changes are not necessarily negative and could be an opportunity for companies to see their vulnerabilities and work on improving them. For instance, organizations that had invested considerably in digitized systems before the pandemic were more likely to adjust to the drastic strategic changes and better control the resultant market externalities. However, companies in the automobile industry have a comparatively low information intensity than logistics (Seetharaman, 2020)—this makes digitization all the more ineffective. High information intensity is associated with the effectiveness of digitation for a given entity. Companies in the service industry are thus advantaged when countering COVID-19 impacts through digitization. To counter such issues, Audi and BMW, and Daimler have invested tremendously in AI technology to ensure efficiency and less reliance on human resources in assembly lines. Such investment means that production lines will not be significantly affected by the imposed social-distancing rules.

Chapter 3: Methodology

This section discusses the methodology and techniques that guided the data collection of this dissertation. The methods to be applied for the conduction of the in-depth interviews and subsequent analysis are describedin more detail due to their importance for the results of this dissertation.

3.1. Research methods

Research usually relates to the method of getting generalizable results, that does not necessarily follow a predestined route (Wiedersheim-Paul & Eriksson, 1991). Nevertheless, in order to evaluate outcomes and reach findings appropriately, a systematic method for the compilation of data and their assessment is required.

According to Arbnor & Bjerke (2008), a goal-mean direction requires the concept of a research aim based on which the investigator then collects data in order to achieve this objective. After deciding on the goals of the dissertation at an early stage, the writer then proceeds to identify the required means to achieve the goals of the thesis, including the instruments, databases and studies to be used and implemented. Based on that information, a goal-mean direction governed the general approach to analysis for this dissertation.

Furthermore, an abductive method "serves as an organizing framework within which a variety of more specific research methods can be located" (Haig, 2008, p. 103). Also, an abductive strategy means to have incomplete observation with the best possible prediction. In contrast to an deductive or inductive study approach, the abductive approach means to have incomplete observation with the best possible prediction that may be true, instead of concluding from a general rule to a specific conclusion which is always true (deductive reasoning) or to conclude from a specific observation to general conclusion which may be true (inductive reasoning) (Haig, 2018). In addition to that, the abductive strategy minimizes the weaknesses of the other approaches by taking a pragmatist point of view. (Haig, 2018). Especially, the absence of clarification in terms of how to choose the hypothesis to be evaluated when formulating theories criticizes deductive strategies. In the other hand, inductive reasoning is questioned because no amount of empirical data will necessarily make theory-building possible (Haig, 2018).

The collection and assessment of data from areas of both theories and empirics was carried out by implementing an abductive study method. An abductive strategy seems the best approach due to the to the complexity of the dissertation and requires both an inquiry of current trends of the automotive industry and macro-environmental trends and developments, as well as an acquisition and execution of fresh information.

The writer has chosen this technique because it enables links and findings to be drawn between the theoretical research and managerial perspective, potentially resulting in promising ideas that add value to the dissertations general objective.

While quantitative approaches are usually considered more adequate if an analytical technique was selected, qualitative methods are considered more appropriate if a system technique was adopted (Arbnor & Bjerke, 2009). An exception is the system dynamics quantitative approach which measures the trade-offs in a system. These systems are very data-demanding which is why this dissertation proceeds with qualitative data. However, it is also unnecessary because the goal of this dissertation is to understand the reality from the point of view of those who are involved. For that, a in-depth understandting through an qualitative analysis seems imperative.

Within this dissertation, different frameworks of analysis were used. The following figure gives an overview about the models applied.

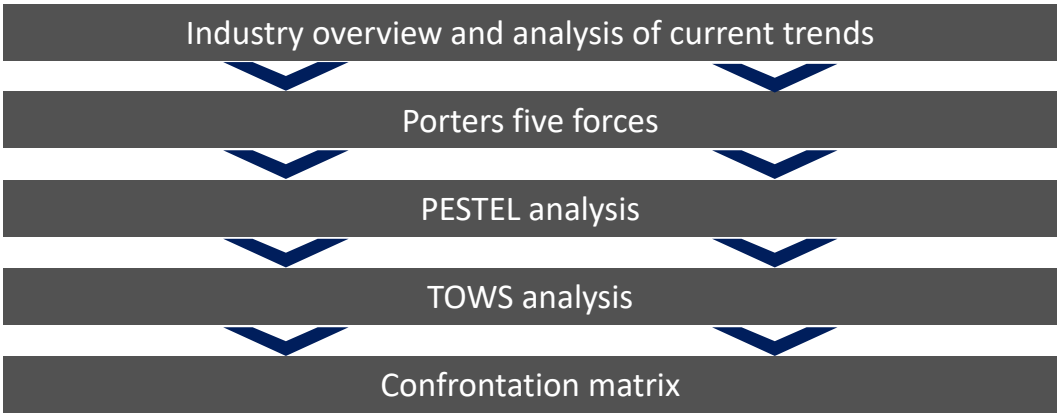

Table 3.1.: Overview about the used frameworks

In the first step, an analysis of current trends in the automotive industry based on literature got conducted. This gave the writer the opportunity to get deeper insights into the industry dynamics. For all following steps, literature got combined with the results of the interview experts. In order to get an overview about the industry environment, Porters five forces got applied. After having a better understanding of the micro-environment, it seemed logical to explore the macro-economical side in its forces through the PESTEL analysis. The next step of the analysis – the TOWS analysis – links the exploration of the industry environment and the macro-envrionment. As a last step, general strategies got prposed through the confrontation matrix.

3.2. Methods of data collection

Given the main research questionto explore the effects of market dynamics in firm resources andcapabilities as driver of competitive advantage, a qualitative approach through semi-structured in-depth interviews was chosen.

In-depth interviews are commonly used method of qualitative data collection. Interviews as an instrument for data collection help the researcher to find out about the personal attitudes, practices and motivations of individuals, and therefore to win a deep understanding of the individual and consequently the research matter (Gill et al., 2008). Because there is little known about the actual market forces and the impact of COVID-19 on the automotive industry's longer term plans, in-depth interviews are an expedient way to explore of new knowledge about the topic. Also, interviewees tend to talk more and be more honest and open in a personal conversation than in a group. This is especially true for highly sensitive subjects. It also allows to go deeper into the relevant topics (Gill et al., 2008).

In total, five high-ranked managers from the Daimler AG, BMW Group and the Audi AG were interviewed. This covers all companies in the scope of this disseratiation which are German premium OEMs. The interviewees were selected based on their position and experience. The goal was, to get participants, which are relatively high in the internal hierarchy due to the strategic orientation of the topic of this dissertation and have a long wirking experience in the automotive field (more than 6 years). It was important to get choose interviewees that ideally work in a strategy-related department, although managers at a certain level in the hierarchy always have to take care of strategic questions.

In order to connect with proper potential interviewees, the writer used only his personal network. Due to the authors working experience at the Daimler AG the field of strategic procurement as well as another intership as the Assitant to the vice president of procurement at the Porsche AG, a strong and far-reaching network enabled to get access to high-ranked managers. The following figure displays a normal hierarchy for a German OEM and enables an assignment of the interviewees in terms of their position. Four of the five participants are area managers who are directly reporting to the board members and of them is a senior manager reporting to an area manager. Due to that fact that all interviewees are exactly those people who have a huge impact on the decision-making in their area and the whole company, their significance for this dissertation is vast.

Table 3.2.: Hierarchy structures in OEMs

For interviewees' protection purposes and a better access to information, guarantees of anonymity were made through verbal agreements. Before each interview, the objective of the study got explained to the participant and also here, verbal agreements were made about the consent to use all the information of the interview for this dissertation. all responses shown in this dissertation have been anonymized. Before each interview, the objective was explained to the respondent. Thus, all interviews were conducted through uniformed interview templates (Appendix B). In total, . Details on each interview are presented in Table x. As shown in the table above, most of the participants of the Daimler AG.

Due to COVID-19, all interviews were conducted by video calls between the 1st of September 2020 until the 15th of September 2020 with an average duration of approximitely 37 minutes. The interviews started with small talk in order to loosen up the atmosphere. Then, the transitions were made through introducing the research matters. The interview guide in Appendix B was used as a guideline but spontaneous questions arising in the course of the conversation were answered as well.

All interviews were conducted in English and were recorded with participant consent through an audio recording program. Afterwards, the interviews were transcribed with the help of the NVIVO software program, although the author had to manually correct that transcriptions due to a strong dialect of a few participants which led to a high rate of incorrect software-gernerated transcripts. All data related to the interviews was secured by passwords, in order to meet the privacy agreements with the interviewees. Due to the tight time schedule of the interviewees, especially in times of a global pandemic, the length of the interviews ranges from 26:25 minutes to 48:13 minutes.

Due to privacy concerns of the interviewees and in order to create more open interviews, the real names of the interviewees will not be disclosed but they will be named with their alias. The table below contains all information, which are allowed to be published in agreement with the interviewees.

Alias	Company	Department	Experience in the automotive industry	Duration of the interview	Date of the interview
Manuel	Daimler AG	Head of strategic procurement	23 years	48:13 minutes	15th of September 2020
Arvid	Daimler AG	Area manger quality management GLC/GLS	17 years	34:42 minutes	5th of September 2020
Lukas	Daimler AG	Senior manager strategy	14 years	26:25 minutes	1st of September 2020
Hans	BMW Group	Head of R&D electrical components	26 years	38:54 minutes	8th of September 2020
Jan	Audi AG	Head of cooperation management	7 years	36:32 minutes	13th of September 2020

Table 3.3.: Information about the interviews

The number of interviews may not seem not high, they are in-depth, and these are very high level managers, who are difficult to get access to, especially in demanding times like at the moment. Due to the fact that there are no prescribed numbers of interviews needed and the feeling of the writer that after five interviewes, the level of saturation was reached, it was decided not to conduct any further interviews.

3.3. Data Analysis

A content analysis must be done in order to encapsulate a vast volume of non-numerical data into well-defined categorized details (Neale et al., 2016; Stemler et al., 2010). This content analysis was conducted through the software program NVIVO. NVIVO is software that is composed of a complex structure. Ideally, the software is used to work with bulks of data that are characterized with the diverse forms of formats. More specifically, for structuring the projects that carry large number of data sources, in order to ensure transparency and more organized coding system, the software is used. The interface of the NVIVO has been separated into various sections that are based on the contents and the related factors that are to be used (Phillips & Lu, 2018). In terms of data reduction and structure, the creation of a code system is a valuable step, as it gives the researcher access to a greater understanding of elaborate content (Basit, 2003). The study itself, however, is still in the scientist's possession, as the program merely enables the management of data (Neale et al., 2016; Stemler et al., 2010).

Subsequently, by examining existing literature on the subject, as well as the interview script, a preselection of groups was built in an a priori approach. Since research literature is sparse, these definitions have been updated, adjusted and completed by analyzing the actual data obtained pre and post coding process in terms of integrative. Ultimately, as per its importance, all data are grouped into an organized multi-level tree of classes and codes that in essence forms the foundation for the development of analyzable outcomes. Apendix C contains the complete coding that was used in the qualitative analyisis with their definition and examples.

The transcripts obtained were read through a few time in order to be able to start with the coding dictionary (Appendix C). The next step involved identifying the codes that were recurring and the topics that they related to. Similar codes were merged, and related codes were categorized under one theme. In the next step, the codes and associated data were revisited to ensure that they were aligned to the research question. Finally, theme names were chosen based on the core message of the theme.

and the results of the coding process were evaluated and validated conceptually through the recognition of themes and corresponding answers with regard to the established categories.

Chapter 4: Interview Results and Discusssion

This chapter offers the analysis of the views and opinions of the experts in the context of the core competencies of past and the future. It also includes the anticipated change of business model components that will assist in keeping their competitive advantage resilient while considering the concurrent megatrends and the past events with COVID-19.

4.1. Analysis of the macro environment – PESTEL Analysis

Before proceeding with the evaluation of the expert interviews, it is important to analyze the macro-environment these OEMs operate in. For this purpose, the PESTEL analysis will be essential. It helps to summarize and classify the main factors in political, economic, social, and technological domains, which have the crucial impact on the car manufacturers' operations. This investigation covers the worldwide market, which is why only key streams and trends can be analyzed. They include the major trends in the above mentioned dimensions and are a solid base to derive new core compentencies for OEMs.

The international governmental regulations regarding the CO_2 footprint reduction targets urged the OEMs to enhance their e-mobility concepts (The European target for 2021 is 95-gram limit on CO_2 emissions and 59 grams for 2030) (European Union, 2019). Also, the governmental mandates for telematics are getting stricter. Both, in developed as well as emerging markets, governments place a great deal of emphasis on improving road safety. This results in a growing number of mandates for services such as e-Call or Stolen Vehicle Tracking (SVT). However, it is important to specify that demand for the SVT is high among countries with a high car theft rate (e.g. Brazil, Russia, China) or amid strict insurance requirements (e.g. Italy, the UK), with virtually no demand in Germany due to a lack of impetus (GSMA, 2013).In addition to that, more and more governments set incentives to buy electric vehicles through subsidies for zero-emission vehicles ownership. This has clearly an effect on consumers' purchase decision. Therefore, through such subsidies, the sales numbers of electric cars are increasing (Nunes & Bennet, 2014).

Regarding the economical component, one key measurement for the macro-environmental impact on OEMs is the disposable personal income. This is a measure of income after taxes. The disposable personal income is shrinking at the moment. In the one hand, amid the recessions, consumers tend to tighten their belts temporarily avoiding expensive luxury-branded goods. On the other hand, customers are reported to wish cutting-edge technologies to be built in their cars.

However, they are not willing to pay for them a high extra cost. Therefore, it is the task for OEMs to find a trade-off between no-frills standard vehicles and customized connected cars with integrated infotainment modules (KPMG, 2019; Magna Industry Research, 2019). In addition to that, the producer price index (PPI) reflects inflation for the raw materials used by the industry. The companies' profit margins may be constrained by an increase in the PPI. Meanwhile, price competition, on the one side, and contractual commitments with retailers, on the other side, may impede adjusting the selling prices to offset the PPI changes. However, vertical inter-firm collaboration may help OEMs in transposing a part of production costs on suppliers (KPMG, 2019). The PPI increases strongly since 2016, according to the OECD (2020). This indicates a shrinking profit margins for OEMs due to higher prices of raw materials. However, other possible variables like interest rates and currency exchange rates got excluded of this analysis because they are too volatile and would also not help to reach the research questions of this thesis.

There are various social trends at the moment, affecting the German car industry. The hyper-urbanization is assumed to be decisive one. Today over half of the world population are living in cities and approximately two-third of the population is expected to live in cities by 2050 (Deloitte, 2019). As a result, the traffic jams and expectations of new mobility solutions will change the business models of the OEMs. In addition to that, consumers display an increasing interest in eco-friendly vehicle options (KPMG, 2019; Deloitte, 2018). According to Deloitte (2019) projections, by 2025, consumers will have an ability to choose from a range of powertrain options that best meet their needs, including more efficient traditional gasoline-powered engines, plug-in hybrids, vehicles powered by natural gas, and pure electric vehicles. However, some survey results indicate that desire for electric cars is not always rooted in environmental concerns (Deloitte, 2019). Some consumers are not willing to compromise on their lifestyle and brand preferences and incline to electric vehicles only due to economic considerations in terms of the total cost of ownership. Nonetheless, the initial high purchase price for e-vehicles is – at least at the moment- a hindrance to a wider adoption of this green technology.
Regarding Connectivity and infotainment, the car features, valued by consumers have shifted from the vehicle performance to connectivity and infotainment systems (McKinsey&Company, 2018; KPMG, 2019). Also, the motorization connected with car ownership is reported to lose its appeal as a status symbol, especially among the under-30s, and it will fall further by 2025 (KPMG, 2019; Deloitte, 2019). Furthermore, Generation Y is more connected than any other previous generations and, as a consequence, is highly interested in vehicles that allow them to remain connected, and reduce costs (Deloitte, 2019; GfK, 2019). On the other hand, data protection seems to become more and more important due to increasing privacy issues concerning personal data obtained from connected in-car devices. Here, data protections law enforcement is needed (Deloitte, 2019).

Regarding the technological factos, Big Data services are gaining in importance as they allow OEMs to utilize data in their new strategies more effectively. Collecting, intelligently analyzing and delivering derived data products could be a key revenue stream (Arnold et al., 2015). It is estimated that the summed-up revenue pool will be between 450 to 750 billion USD by 2030. Particularly high growth rates are foreseen for storage (CAGR 61.4 %), networking (CAGR 42.4 %) and services (CAGR 39.5 %) (McKinsey, 2016).

Technological progress also brings new chances regarding the use of materials. New lightweight materials (carbon fiber, high-tech steel) are supposed to be available for mass market production within the next years and improve the power-to-weight ratio, thereby enhancing energy-efficiency of a vehicle and resulting in lower CO_2 emissions (KPMG, 2019; Berger, 2017). Audi is a flagman in adjusting aluminum and carbon fiber in mass production (Berger, 2017).

Furthermore, new infotainment technologies became available through cross-industry collaborations (Deloitte, 2019; KPMG, 2019). Breakthrough innovations in connectivity, telematics, smartphones, applications, and smart card technology have a tremendous impact on the OEM business models (Deloitte, 2019; GSMA, 2013).

The legal situation ist mostly impacted by the laws for stronger CO_2 in the EU, but it is also a global trend due tot he environmental concerns of consumers which got fueled by the manipulation of software and hardware of diesel engines from VW and other OEMs (KPMG, 2019; European Union, 2019). This also led to some bans of older diesel cars in some cities in Germany which is producers are forced to prioritize to change their product portfolio to a more sustainable one (Spiegel, 2019).

When it comes to environmental forces, availability of non-renewable goods, climate change and pollution the are the key macro-economic forces. The market can be vastly altered by the availability of non-renewable products, especially common ones such as oil or natural gas. If the availability of these products decreases (as is currently happening), prices can increase higher, impacting companies or people that use fuels. Also, there is growing evidence that as a consequence of greenhouse and gas emissions, the era of a relative equilibrium under which humans evolved could be coming to an end (ECB, 2020). Nonetheless, humanity has been releasing ever-increasing levels of greenhouse gases since the industrial revolution, such as CO2, which have the ability to lift the global average temperature. These pollutants have had a marked effect on the composition of the Earth's atmosphere: global CO2 levels have increased and human activities are estimated to have contributed to about 1 ° C of global warming relative to pre-industrial times (ECB, 2020). Thus, the impact of air pollution is expected to accelerate in a negative way in the next decades and will effect healthcare cost and lost working days due to premature deaths (OECD, 2016).

Through summarizing the research findings of the PESTEL which includes literature as well as the interviews, it can be stated that German OEMs are standing at the threshold of a new automotive era, where success depends on a closer collaboration between automakers, telecom providers, insurers, and car rentals, as well as new ways of handling Big Data. Congested urban areas, changing lifestyles, environmental consciousness, and new mobility solutions are contributing to more collaborative approaches to transportation, including the car-sharing concept. An increasing interest in connectivity, reinforced by the governmental mandates for security telematics, more attractive pricing, and decoupling of the apps from smartphones will facilitate a growing demand for embedded connectivity, notwithstanding the current customers' reluctance to pay for extra services. Consumer favorableness to e-vehicles could also represent a tipping point in the further development of alternative power trains in Germany. Automotive manufacturers should place a great deal of emphasize on the Generation Y with all their specific requirements and needs. German OEMs have an opportunity to reap the benefits from this powerful consumer segment. Therefore, the German OEMs should incorporate these new automotive trends and consumer expectations in their new strategies and business models to ensure competitive advantage in the long term.

4.2. Analysis of the industry environment

In order to create a clear picture of the microenvironment of the automotive industry, Porter's five forces model is applied (Porter, 2008). It represents a framework for industry analysis that determines the competitive power and appeal to the market through analyzing the threat of new entrants, competitive rivalry, threat of substitutes and the bargaining power of suppliers and customers.

Traditionally, the automotive industry was considered as one with higher entry barriers. Consequently, there was a low threat of the new entrants due to a strong brand appeal, a well-developed value-added chain, high requirements for R&D capacity and substantial investments in innovations. Currently, new entrants, indeed, face significant obstacles, stemming from the high fixed costs of ever complex smart and connected IT in-car fringes. Entry barriers can surge even higher, as connected cars increase customer loyalty and switching costs (Porter & Heppelmann, 2014). However, recently the situation has changed dramatically. The globalized nature of the industry in conjunction with new technology players, such as Google with their self-driving car, possessing important know-how and profound expertise in handling a big amount of data, impose an additional threat of new entrants from IT and telecom industries (KPMG, 2019). This is especially true for e-vehicle production with li-ion batteries, supplied by the third parties.

Therefore, suppliers like Google, Apple, and AT&T which have enough resources and strong brand image can enter the automotive market by commoditizing physical components from the OEMs, thereby turning the buyer- supplier relationships upside down (Porter & Heppelmann, 2014). In contrast the the view of Porter & Heppelmann (2014), the common opinion from the interviewed managers is that it is just a too unattractive segment for those players and that if they really enter the market, they will probably only sell the systems to OEMs. Moreover, due to the globalized nature of the industry, the notion of new entrants is not that clear-cut, since existing players might enter new geographical markets. Keller (2004) puts forward a clear example of such case, whereas the drenched European market was accessed by the Korean vehicle manufacturers (Hyundai, Kia). Due.to all those facts, the threat of new entrants can be evaluated by a medium level.

At the moment competitive rivalry is significant, with a high potential to rise in the nearest future (KPMG, 2019; Deloitte, 2019). This threat is reinforced by strengthening the Asian competitors and the German-based automakers coming up with innovative, connected vehicles (Berger, 2018). These infotainment add-ins also enable the OEMs to customize products for individual customers, thereby enhancing their bargaining power and increasing the switching costs for customers (Porter & Heppelmann, 2014).

Currently, the substitution threat in the automotive industry is reduced and therefore on a low level. By the development of in-car connectivity and infotainment systems which are capable of enhancing driving experience, customization and providing additional value comparing with traditional substitutes. However, the recent automotive trends contributed to an interesting phenomenon, when smart, connected cars have triggered new business models which can substitute vehicle ownership by product-sharing, thereby reducing overall demand for cars (Porter & Heppelmann, 2014). Such a product-as-a-service model allows customers to use a car wherever and whenever they need and pay only for the amount of time, they use a car. The threat of such a substitute urges traditional OEMs to enter a car-sharing market with DriveNow from BMW, Car2Go from Daimler, Audi Select program in Berlin, and Audi Unite in Stockholm. The opinion of the interviewed experts in this point is, that car ownership can maybe decline in city areas but overall it will still be the perfect all-rounder.
Apart from car-sharing, the OEMs compete with pay-per-use e-bicycles and electric scooters. This trend is small; however, it is springing up in more and more cities (KPMG, 2019). Another threat of substitution comes from shared bike systems, allowing residents to reserve and track the bike whenever they need with a help of smartphone application (Porter & Heppelmann, 2014). This trend is anticipated to be a viable mobility solution for congested urban areas especially appealing to the Generation Y in the next decade (KPMG, 2019; Deloitte, 2019).

Bargaining power of customers remains on a medium level due to the relatively high intensity of competition on the global scale and increasing overcapacity in the major markets. Consumers have an easy access to various types of information channels and are allowed to choose from a number of the OEMs and dealers (Berger, 2018). The power of brands is diminished among some consumer groups (KMPG, 2019) that results in further strengthening of the customers' bargaining power. However, the bargaining is not merely about price. On the one hand, connectivity and customization allow the OEMs to tailor a vehicle to the specific requirements of the client, thereby increasing customer loyalty and the switching costs (Porter & Heppelmann, 2014). On the other hand, car-sharing services have the possibility to reduce the switching costs and increase the customers' power (Porter & Heppelmann, 2014).

Notwithstanding the escalating consolidation within the automotive industry, the bargaining power of suppliers is on a medium level. Moreover, driven by the intention to increase profitability, the OEMs used to impose a part of R&D costs on suppliers to be recovered over a certain period through amortization (Veloso & Kumar, 2002). However, with an increased demand for the connected cars, the OEMs feel a lack of special capabilities and expertise and are urged to establish collaborations with top software, data storage, connectivity, sensors, and infotainment systems providers. It increases the bargaining power of the suppliers and sharing of the industry profit (Porter & Heppelmann, 2014). A good example of such cooperation is the Open Automotive Alliance, in which Audi together with three other auto giants like General Motors, Honda, and Hyundai joined their efforts in adjusting Google's Android operating system for their vehicle add-ins.

However, the power of traditional OEM suppliers providing physical components will further decline, as the importance of these parts will fall in relation to the increasing importance of software in car manufacturing (Porter & Heppelmann, 2014). The figure below summarizes this analysis.

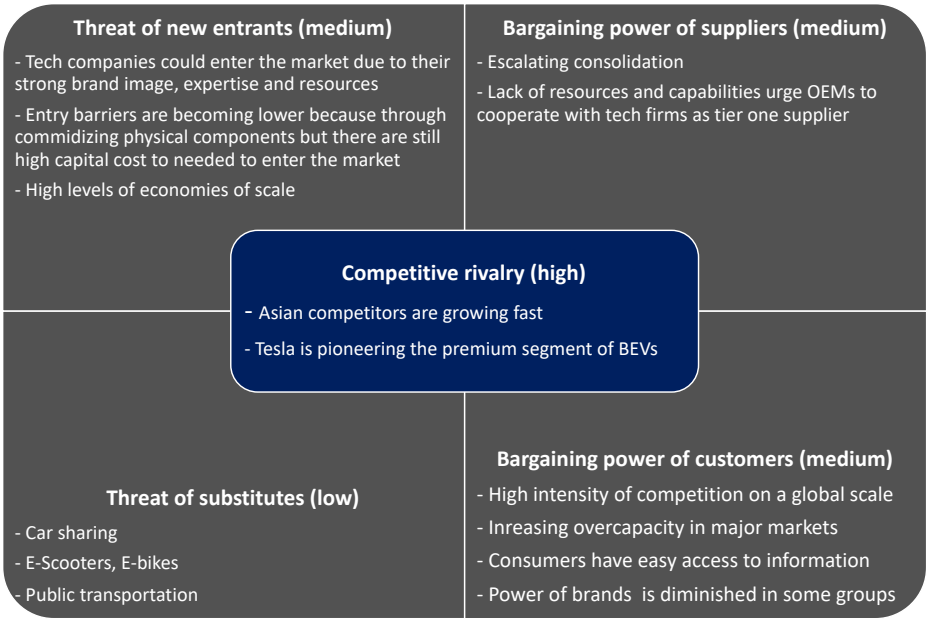

Figure 4.1.: Porter's five forces applied to the automotive industry

As a result of Porter's Five Forces analysis, it should be pointed out that the automotive industry is experiencing dramatic changes. Notwithstanding, highly competitive rivalry and increasing but still low threat of product substitution by lower switching cost thourgh car.sharing, the market does not lose its attractiveness. On the contrary, the treats of new market entrants from technology firms, as well as a strengthening bargaining power of customers should be addressed in the business models. However, the OEMs should to offset the rivalry by engaging in more complex product-design, connectivity, and deliberate data storage. Typically, this leads to increased fixed costs which manufacturers will try to spread across a larger volume of output (Porter & Heppelmann, 2014).

4.3. TOWS analysis

In order to mitigate market threats and OEMs weaknesses by exploiting the company's internal strengths and harnessing external opportunities, TOWS analysis will be essential. The TOWS analysis is a tool to combine findings from the industry environment (Porters five forces) and the macro-envrinment (PESTEL).

It clearly shows that shrinking the OEM's margins are reinforced by the volatile market conditions, changing consumer demand, excess capacity in developed markets, stricter regulations and augmenting competition from the Asian and other manufacturers. Consequently, it presents substantial threats to German automakers, especially when those developments hit the lack in know-how of OEMs to develop proper softwares for electric vehicles.

However, an increasing demand for in-car tech fringes and economical and new ways of mobility leaves open a window of opportunities for the OEMs that are willing to engage in inter-firm collaboration to realize their shared goals. Consumer thirst for connectivity is currently satisfied by the smartphone integration, mainly due to lower pricing options as compared to embedded telematics. However, in the long term, a closer cooperation with telecom providers as well as governmental mandates for in-car telematics will trigger wider adoption of connectivity and have a downward pressure on prices. OEMs should use the enormous power of their brands, well-trained workforce, strong R&D capabilities and experience in successful inter firm collaborations to mitigate those threats and use the opportunities as good as possible. The following table summarizes the TOWS analysis

THREATS	**OPPORTUNITIES**
• Shrinking margins due to demotorization and car-sharing • Decreasing gasoline prices hamper further e-mobiles' penetration Especially, since COVID-19, the prices deceased a lot • Competition from from Asia and the USA • Consumers are reluctant to pay the extra costs associated with in-car connectivity and view their smartphones as the viable alternative to the embedded telematics • Strict safety standards of carbon dioxide emissions result in increasing manufacturing cost	• Demand for fuel efficient cars • Demand for premium cars with tech fringes as well as super premium cars (Maybach…) • Demand for car sharing in city areas • Demand for hybrid and pure elecric cars • Synergies and cost-sharing within inter-firm collaborations • Increased consolidation within the industry and techological alliances that lead to pruning time-to-market and cost
WEAKNESSES	STRENGHTS
• Electric vehicles are hard to differentiate • Shrinking profit margins • Lack of know-how to develop Softwares for electric vehicles and autonomous-driving-systems	• Perceived high value of German car brands • Well-trained workforce • Slow adaption to changing consumer trends • Strong R&D capabilities • Successful experience of inter firm collaboration

Figure 4.2: TOWS Analysis of German premium OEMs

4.4. Traditional core competencies

In order to explore the traditional core competencies of German OEM related to the first research question, study participants were asked to describe the reasons for the success of German OEMs in the past an thus, try to separate them into internal and external factors. They attributed internal factors for the success of German OEMs - a strong brand image (F=5, N=24). Regarding the brand image, participants named their talented employees (F=5, N=12), a good quality control (F=3, N=7), strong marketing capabilities (F=2, N=3), innovation (F=4, N=9) and also, responents closely linked the "made in Germany" brand as key drivers for the overall brand image histrically. In terms of external impacts, a good infrastructure (F=1, N=2), and the emerging markets (F=3, N=6) were named. Before doing a deep-dive into each topic and relate it to the literature review in chapter 2 of this thesis, the figure below summarizes the respondents` perspectives. Hereby, the structure evolved during the coding process through identifying the codes that were recurring and the topics that they related to. Similar codes were merged, and related codes were categorized under one theme.

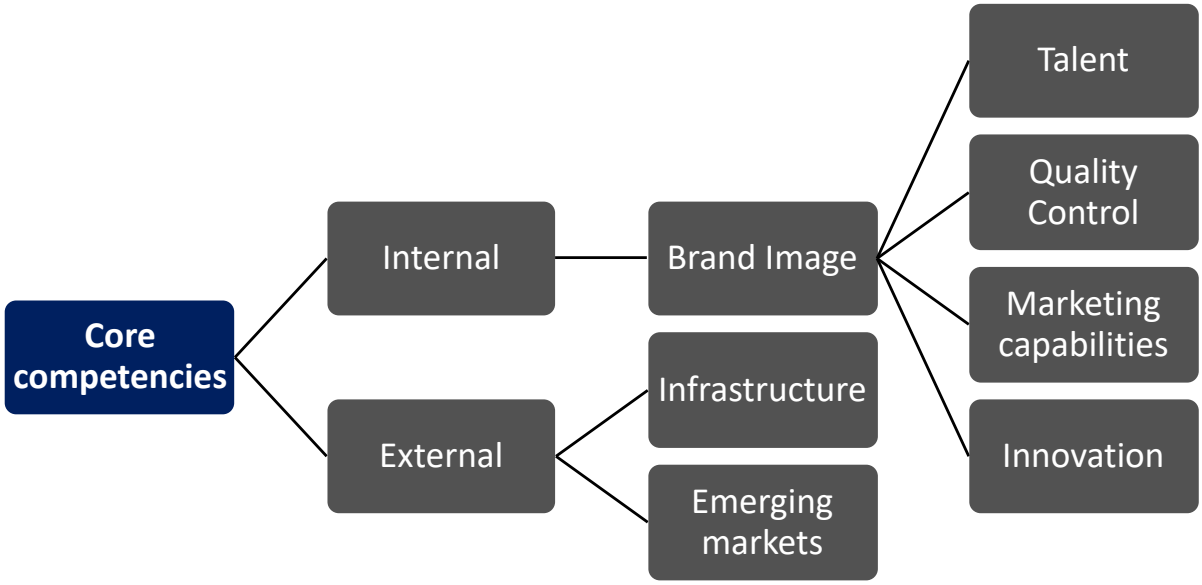

Figure 4.3.: Core competencies of German OEMs in the past (extracted from the interviews)

Participants answered that cars were invented in Germany and the German OEMs pioneered the premium segment of the automotive industry. They have been producing and manufacturing premium cars for decades. During this time, the interviewed companies build an international reputation for quality, durability, safety, and luxury.

This opinion is also backed by literature in which German branded vehicles are compared to world leaders in terms of safety, efficiency, comfort, variety, style, longevity and the overall image (Deutsche Bank, 2014; Zajontz et al., 2011). This strong brand image extracted from the interviews is supported by five pillars as seen in the figure below.

Figure 4.4.: Five pillars of a strong brand image (extracted from the interviews)

One key finding which should get pointed out is that the respondents who are more involved in the production processes indicated that quality is a culture and a collective responsibility. Employees work towards achieving the overall goal – to deliver premium quality cars. Some companies have a digital shop floor management software that is integrated into the system to collect data used to measure progress towards the achievement of quality objectives. They do not have a good quality control, quality is in fact deepanchored in the corporate culture. "*Everything begins with the KPIs in the production itself. In all German OEM plants, we have a very clear KPI-pyramid to ensure that everybody is having the right KPIs to assure that the customer is getting a premium quality car*" (Arvid).

Besides, the German OEMs have institutionalized a learning culture as well as they are having a long manufacturing history and therefore, they have had numerous experiences to derive best practices and lessons to inform today's quality objects. It is a combination of a learning culture with a lot of experience that makes German OEMs strong.

"(…) we've practiced for 100 and I don't know 35 years basically to build the best cars in the world and I think we learned a lot along the way. For instance, around 2000, we had quality problems with our A-Class. In some curves, there was the danger that it crashes, and the metal was oxidating quickly. Now we know we should never save money in materials and better double check new technologies before releasing them to the customer" (Manu).

German OEMs have, over the years, established an enabling and supportive environment that attracts young and innovative minds. The OEMs are known for having the best engineers in the world, who receive the best education from universities in Europe. *"The automotive industry is like a magnet for university graduates, because of a really good working environment. That is also why we get the best people"* (Hans). Indeed, if we look at the data, Germany's world-class education system ensures that the highest standards in the automotive industry can always be met. More than half of the young adults in Germany takes up university studies, with a high concentration in natural sciences and engineering (Bundesamt, 2014; OECD, 2018). Moreover, the automotive industry presents the most popular career path among university graduates in the country, and especially among graduates with an engineering background. (Manager Magazin, 2013; T-Online, 2014) OEMs, in particular premium manufacturers like BMW, Audi and Mercedes-Benz, and tier- 1 suppliers like Bosch or Continental are among the preferred employers for young graduates (Manager Magazin, 2013; T-Online, 2014)

Customer expectations evolve with the changing auto industry. To stay ahead in the industry, German OEMs needed to have skills to develop innovative solutions in line with the prevailing market demands. For instance, BMW developed iDrive, a device with advanced control functionalities that appealed to the young consumer. iDrive is a system of BMW with an integrated navigation system with eDrive zones for plug-in hybrids, a digital car key that you can use with your iPhone as well as voice control and a virtual personal assistant which was a very (Bimmertoday, 2020). "*You also need to always keep your product attractive while the world and the people are changing. Here, the keyword is innovation*" (Jan). Therefore, the iDrive system tackled the market challenge of the customer need for an increasingly connected car with good infotainment systems (Berger, 2018; KPMG, 2019).

Due to very good marketing capabilities, German OEMs are not only successful in the domestic market, but they have a global reputation. Participants attribute this success to a strong marketing strategy that can connect with consumers independent of their geographical location. *"With our great marketing capabilities together with the 'made in Germany' brand we were able to establish a world-wide recognized and desirable brand (…)"* (Lukas).

This is consistent with the Research by McKinsey&Company (2018) and Zajontz (2014) which are saying that the “Made in Germany” image helped to build a very good perception of quality worldwide and that brand helped the industry in Germany to build a strong basement of trust with customers and business partners.

4.5. Core competencies for the future

Having analyzed and discussed the historical core competencies of German OEMs, the look into the future under consideration of the industry-environment, macro-environment and the subsequent trends in the automotive industry is very important. The temporal seperation of historical and future core competencies enables to make the differences and the impact of the current market and industry dynamics more cleary and facilitates the proposal of strategic changes. Also, the exploration of future core competencies is one of the aims of this thesis. When asked the participants what are their biggest concerns about the future and the main challenges they are facing, all respondents clearly indicated that as the world focuses on climate change, there is pressure on the automotive industry to shift towards sustainable sources of energy (F=5, N=47). The industry is now focusing on alternative sources of energy: electrification, hydrogen, and synthetic fuels.

The PESTEL analysis of the previous section also reveals a pressure towards green mobility, due to stronger political and legal regulations and laws, but also because of global warming and the resulting social impact in form of a change in customer demands. In addition, the OEMs do not want to leave government subsidies unused; and they get these, more and more, for selling electric cars (Insights, 2019; Nunes & Bennett, 2010). Although costumer needs and the politics in most countries still focuses on battery electric mobility as the one and only future, the automotive sector further amplifies its research in hydrogen technologies and synthetic fuels (Berger, 2018; KPMG, 2019). For instance, the Damiler AG will sell hydrogen-fueled trucks starting from 2025 with a driving range of 1000 kilometres while their battery electric truck will launch in 2021 but will only have a range of 200 kilometres and have to carry a lot of addiotional weight through the battery cells (Daimler, 2020). Therefore, battery electric trucks can not really be a substitute to the actual ICE trucks, it is just not economical due to the lack of instrastructure of rechargers and the short range (Berger, 2018; KPMG, 2019). Extracted from the information and data available yet, OEMs are planning to first launch hydrogen trucks to be able to increase the efficiency of the technology and then do the roll-out for normal vehicles.

Nevertheless, according to the interviewees, electric vehicles are expected to be a transition point from man-driven to autonomous cars and from individual services to car-sharing services.

These paradigm shifts are the basis of the current global megatrends that have attracted new players, such as tech companies and automotive start-ups resulting in stiff competition. In the face of these shifts in the industry, the German OEMs need to re-adjust their core competencies.

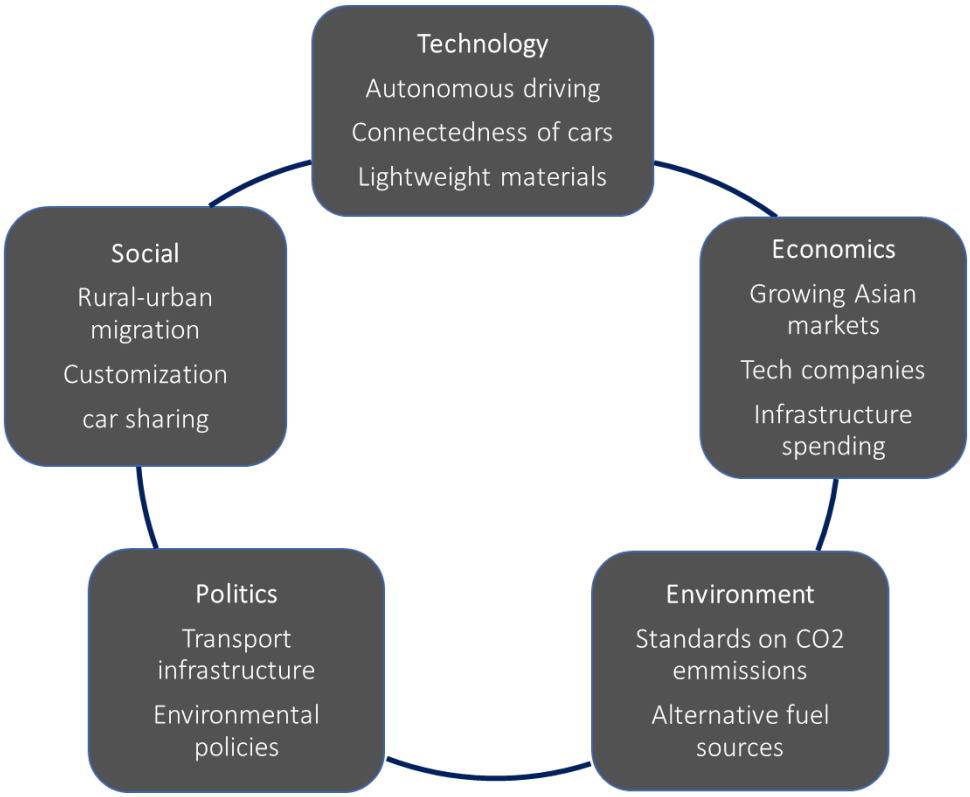

Figure 4.5: Factors driving change in the auto-industry (extracted from the interviews)

The environmental concerns associated with the carbon footprint of fossil fuels leads to a shift towards sustainable energy sources such as electricity. The participants are stated that due to the fact that it is way less complex to build a battery electric vehicle (BEV) than a traditional car with an internal combustion engine (ICE), there are a lot of new entrants from Asia and the USA to the market. These electric car manufacturers such as Tesla or the Chinese manufacturers BAIC, BYD and Geely bring stiff competition for German OEMs. While most lay people probably perceive electric cars as the future of the auto industry, some participants felt that it was still too early to conclude. The cost of producing electric cars is very high due to the cost of the electric car battery. Besides, the road networks and the recharging infrastructures are not ready to support the cars on a large scale. The respondents suggested that the company that would innovate a cheaper and eco-friendly source of energy, was likely to define the next big energy source for the industry. *"(…) if tomorrow someone would find an innovation which makes it possible to create synthetic fuels cheaper than our fuel now and with zero impact to nature, do you think anyone would buy electric cars how they are at the moment?"* (Jan).

The auto industry is changing according to the consumers´ needs and policy pressures. Consumers have increasing environmental concerns but also like to lower costs through an BEV due to state subsidies, lower consumption costs (depends on the local electricity and fuel price) and only about only half of the maintenance cost throughout the whole lifecycle (Breetz et al., 2018; Berger, 2018; KPMG, 2019b). Due to the fact that transportation currently accounts for 24 percent of global CO2 emissions, it represents the fastest growing source of global emissions. Regarding the mode of transport, 72 percent of the emissions globally stem from road vehicles (Wang et al., 2019). In this situation it does not seem surprisingly that municipalities have facilities for BEVs, forbid the circulation of casrs with high emissions and promote BEVs for sustainability reasons (Bjerkan et al., 2016).

Having discussed alternative technologies for more sustainable ways of mobility, the optimization of Internal Combustion Engines (ICE) and use of lightweight materials are also representing potential to decrease CO2 emissions. With ICE optimization, OEMs make cleaner fossil fuels and use that in hybrid vehicles. *"With the ICE-optimization we are able to reach the customer demands of eco-friendly technologies and also trying to meet the climate goals of the European Union"* (Lukas). According to the respondents, a translation of these lightweight materials into the auto industry is going to be a challenge due to the costs involved. Already, the cost of electric vehicle batteries is high and so using costly lightweight materials will affect the production efficiency. "(…) *you got to keep the balance between getting the lightest material possible or the lightest modules possible and also not let the cost run out of hands because of course oftentimes the lightweight materials are more expensive"* (Manu).

Case studies from the aviation sector shows that using lightweight materials reduces the weight of airplanes and lowers fuel consumption (Zhu et al., 2018; McKinsey & Company, 2012). The concept of lightweight construction is to use less materials or lower density materials, yet to guarantee the same or better technical performance. (McKinsey & Company, 2012). From automobile applications to design and packaging, the idea has been widely studied and used in many sectors and provides considerable promise in the aviation market. Usage of high-performance materials such as composites and optimization of structures using computer-aided engineering techniques with development facilitated by advanced manufacturing technologies such as additive manufacturing, foam metals and heat forming have become standard solutions of light-weighting (Zhu et al., 2018). Lesser amount of fuel would directly reduce the level of CO2 emission. Therefore, the development and active and intelligent use of lightweight material, which also involves proper capabilities in operations, seems to be a promising skill for OEMs in the future.

According to the participants, hybrid cars will eventually transit into completely sustainable energy such as electricity. With electric cars, consumers now focus on a high driving range and affordability. In the electric car segment, German OEMs are competing with established manufacturers such as Tesla, manufacturers in China, and the existing ICE cars. With stiff competition, they must develop ways to ensure that premium electrics cars are financially accessible to consumers without compromising quality. *"The main focus for the shift to electric mobility is how can we get cars with a high range and not be too expensive. So still make them affordable even though they're premium"* (Hans).

To cut costs, the OEMs are now looking into standardization processes. Standardization enables them to use fewer materials and use the same frame for many vehicles. Also, business reports indicate this trend (KPMG, 2019; Schaeffler, 2012; World, 2012). According to the interviewees, they also have a series of in-built quality control processes to flag deviations and take timely corrective measures. The challenge then becomes how to balance between standardization and customization so that they still appeal to consumers and charge a premium price.

"If you standardize everything you won't be able to sell an S-class for 200,000 bucks anymore…it's pretty complex to define what the right level of standardization is. But overall, it's a pretty nice opportunity to reduce costs without making sacrifices to quality and innovation" (Manu). To interpret this statement, OEMs want to standardize platforms and other parts for cars in order to cut cost. This can be an opportunity but on the other hand, you still need to differentiate the cars enough to have a reason to charge customer a high price.

The auto industry is fast evolving from just being producers of cars targeted for individual mobility and commercial use to a mobility industry. The new entrants have the advantage of establishing their companies based on this new culture. Old OEMs, however, have the daunting task of changing the company culture. Now, people resist change, and this may affect the speed with which they can adapt to change and may also threaten their very survival.

"…some new players can directly jump into the premium segment because they use the process of changes in the mobility market itself, which makes this very easy. The old OEMs has to pay a high amount to make these changes and…I think, that some old OEMs will disappear because they change themselves too slowly" (Arvid).

Summarinzing the key findings of this section, it can be stated that in oder to cope with this very dynamic and industry and various forces impacting the OEMs, they have to be able to adapt quickly to new trends and changes in the micro- and macro-environment. As we could see in this section, there is a big need for a switch to more sustainable technologies.

This is also connected with another resulting core competency: customer focus. OEMs should always watch out for the latest needs of their target group and try to implement strategies to filwill those needs. This is possible through fostering innovative power within the own company but also in collaboration with other companies which maybe have the resources and capabilities to achieve this innovations in a specific field. The following figure summarizes the future core competency and can be seen as the answer to the second research question.

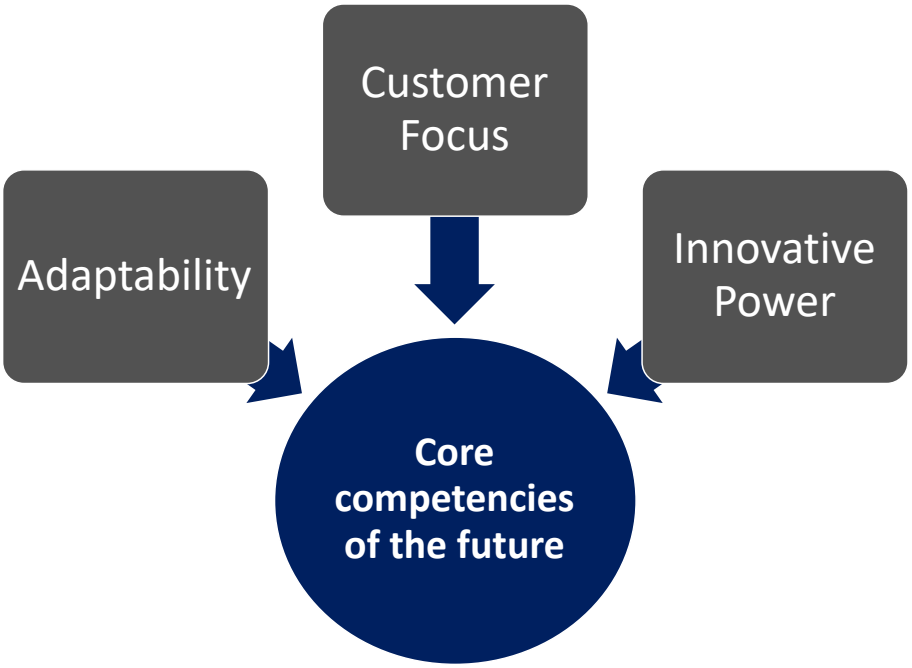

Figure 4.6: Core competencies of the future (extracted from the interviews)

4.6. COVID-19 & the competitive advantage of the future

Having examined the future core competencies the questions arises, what OEMs should achieve with these skills. COVID-19 pandemic threatened the very survival of the companies that pioneered sales of premium cars due to a decline in sales. The pandemic resulted in an economic crisis and a change in consumer behavior patterns. During an economic crisis, the disposable income and the consumer's purchasing power are reducing simultaneously. They are, therefore, likely to prioritize basic needs (Bauer & Weber, 2020; Kucharski et al., 2020). According to the respondents, OEMs simultaneously were still incurring fixed costs of physical locations and employees. Depressed sales coupled with constant fixed costs affected the profitability of the OEMs. Also, existing research in sharing this point of view and explains a sudden drop since COVID-19 begun to spread (Bauer & Weber, 2020; Kucharski et al., 2020).

The main response strategy for the interviewees was to develop sustainability-based models that would focus on optimizing supply chain efficiency. The first business activity was to accelerate the digitalization process. One of the containment measures against the pandemic was restricting movement. The number of visits to physical locations declined and consumers accessed goods from online platforms. Previous case studies had shown that companies with well-established e-commerce platforms like Amazon registered increased profits when COVID-19 started to spread in coutries they are operating in while businesses that retained their retail stores collapsed (GTAI, 2020).

‘‘*Karstadt [a department store chain, similar to El Corte Inglès] was one of the biggest non-food retailers in Germany and now they are closing a lot of their shops because COVID hit them hard. In contrast, Amazon had a really good time with an all-time high stock price during the lockdown because everyone was ordering stuff from them”* (Jan).

Evidently, the OEMs were convinced that a move to online sales was the future of business. However, they were also measuring the risk rather than making an entire online existence, the OEMs are using a mix of online and traditional models of selling. “(*…) we've started opening up our online configuration to order your car there and we're looking closely at how the customers are doing whether they use it or not but overall, I say of course it's (COVID) accelerating all the digitization stuff as well*” (Manu).

The second approach was the cost-benefit analysis to determine what activities were financially profitable for the OEMs. Some companies decided to postpone cost-intensive projects such as the development of hydrogen cars and instead focus on projects that were likely to have a higher demand like electric cars. *“One project we have postponed into the future is the development of hydrogen cars. Simply because it was such a big cost factor for us…and are now mainly focusing on electric vehicles as an alternative fuel”* (Lukas).

According to the participants, transportation policies banning cars from entering city centers and a focus on walkability in urban areas are encouraging more and more people to use public transport or complementary services such as e-scooters and bikes. *“In the Nordic countries, you can see that a bunch of cities are closing down the city centers for vehicles, allowing people to use their bikes, walk more, but also increasing the public transportation”* (Hans). People living very close to the cities have many transport options including walking, car-sharing, and e-scooters. These options are not available in rural areas where people still heavily rely on individual mobility.

While participants do not perceive these complimentary services as a big threat to car ownership, they predict the expansion of the OEMs in form of range of services to include car-sharing services. ‘‘*The car producers will not just be car producers. They will change a part of the company to become a mobility offering company with an own fleet of shared mobility”* (Arvid).

Some of the interviewed OEMs have added few of these mobility services to their portfolio. *"That is also not really a threat. Especially because we have our own scooter rental company, we are winning in every case"* (Lukas).

However, the participants perceive car ownership as being superior to all other forms of mobility services and do not see the possibility of a complete replacement. A car offers freedom and allows one to travel wherever they want at whatever time they want. *"I think a car will always be a desirable object since it does represent freedom (…)"* (Lukas). An own car represents individuality, "*If you look at really big trends like sustainability there's also individuality. Individuality is a pretty big trend as well and I think people will still and want to own a car in five and also in ten years"* (Manu). A car is being versatile. It is ideal for both short and long-distance travel. On the other hand, the services such as e-scooters are good for short distances and things like drones are ideal for long distances.

*"Imagine the craziest kind of stuff like a drone which is relatively cheap. You can maybe go 400 kilometers and you are way faster than by car. But can you go to the bakery which is 3 kilometers away from you? No. The car is at the moment the perfect all-rounder" (*Jan).

A car is convenient when compared to public transport that is not always on time, can be noisy, crowded, and thus not ideal in current times of COVID-19 that is easily transmitted via contact. "*Even if you like it to go on crowded, loud and unpunctual trains or other public transportation, it normally takes a long time to go somewhere by public transportation. Also, no one wants to go on public transportation during a time like COVID, if it is even possible"* (Jan).

The figure below summarizes the mentioned arguments.

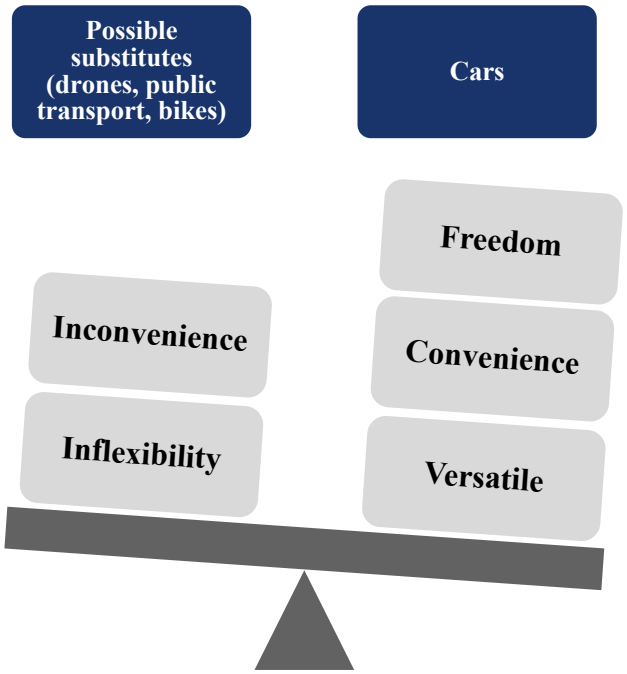

Figure 4.7.: Expected feeling with car and substitutes (extracted from the interviews)

Regarding the transitioning from electric cars to autonomous and from individual to car-sharing services, the interviewees were all on the same page: It will require auto manufacturers to partner with well-established tech companies. With the transition, car ownership is expected to decline as consumers will have a preference for renting self-driving cars or car-sharing. However, there are still a lot of challenges that remain unsolved. Hence the transition may not occur in the near future. Some participants predicted a period of not shorter than 10 years. ‘‘*The autonomous stuff and not to sound pessimistic, but I think it's still a pretty long way to that point…driving ROBO a car in the next five to ten years basically the whole market it's not going to happen”* (Manu).

One of the challenges includes a successful transition that involves multiple stakeholders along with the policymakers to make favorable policies and investors to develop the supportive infrastructure. Currently, roads have multiple users including pedestrians, other motorists, cyclists, and it remains to be known whether self-driving vehicles can navigate these roads.

“The hardest thing…is like really inner-city traffic because you got other cars, you got traffic lights you got people walking over the street you got bicyclists. You got everything. It's just pretty complex” (Manu).

According to the respondents, the greatest challenges, however, are ethical and technical issues. On ethical grounds, some scenarios would require human intelligence. For instance, *“(…) if there is a kid and an older man on the street and you are driving with 100 km/h and the car knows you have to kill one of them, which one will it be?”* (Lukas). In fact, this is a very typical question in studies about autonomous vehicles. The thought is that the girl had no first love, no family of her own, no job, and no other adventures and pleasure all her life, whilst the grandma has already had a full life and her fair share of encounters. In comparison, the little girl is more of a religious innocent than just another adult. According to the relevant professional codes of ethicts, age is not a relevant variable. In our crash case, discrimination on the basis of age would appear to be the same evil as discriminating on the basis of race, religion, gender, disability, national origin, and so on. However, laws of countries can very from this and therefore, OEMs need to address this questions to the politics or instituutions who are responsible for making these laws in order to get a guideline (Maurer et al., 2014).

Regarding the technology which is needed for to enable autonomous driving, proper software systems are important to run fully autonomous cars. While OEMs are known for the best engineers, they lack the capacity for the future of the industry.

“*VW has a lot of problems at the moment with the software for their new electric car “VW ID”. Without proper software, you cannot build electric cars, you cannot build well-connected cars and you cannot build autonomous cars.”* (Jan).

Thus, the study`s participants perceived it as fit to collaborate with tech companies that have the expertise for software development. Some of these include Google, Alphabet, and Uber.

Some German OEMs have already developed strategic partnerships towards the achievement of this objective. *"(…) we will do our operating system called MBUX. So, we are working pretty hard on that we've recently announced a strategic partnership with NVIDIA as well"* (Manu). This view is also consistent with the literature: the OEMs feel a lack of special capabilities and expertise and are urged to establish collaborations with top software, data storage, connectivity, sensors, and infotainment systems providers. (Porter & Heppelmann, 2014). A good example of such cooperation is the Open Automotive Alliance, in which Audi together with three other auto giants like General Motors, Honda, and Hyundai joined their efforts in adjusting Google's Android operating system for their vehicle add-ins (Porter & Heppelmann, 2014).

Summarizing the research findings of this section, the prospective competitive advantage of German premium OEMs is built on three major pillars: Collaborative business models to foster innovation and integrate new technologies in the vehicles, new mobility solutions like car-sharing and e-scooters to cope with the impacts of the macro-environment and sustainability based models to fulfill the customer needs, policy pressure through politics, new legal situations and the climate change.

4.7. Corporate adjustments

4.7.1. Business Model Environment

Business models are always developed and implemented in a given and defined context. Therefore, it is a requirement for effective future planning to build a map of main external factors shaping the development of new business models. According to Osterwalder (2012), these main external forces are: market forces, industry forces, key trends, and macroeconomic forces. Having examined all those parameters in this dissertation through the analysis of the automotive market and trends as well as the appliance of Porters five forces and the PESTEL analysist, Appendix X summarizes them in accordance with Osterwalder's model for the business model environment.

This summary gives a holistic view on the automotive industry and could be a basis for a subsequent modification of the business model. Useful tools and frameworks in order to create a modified business model would be the Four Actions Framework (ERRC grid) suggested by Osterwalder (2012) which is known as the Eliminate-Reduce-Raise-Create grid and the Business Model Canvas approach of Osterwalder (2012). Due to the limited frame and depth of this dissertation, a specific and accurate creation of an adapted business model seems inappropriate. Instead, this dissertation builds a Confrontation Matrix upon the TOWS analysis to suggest the basic strategies for German OEMs. The results of the experts interviews are also going to be integrated in the confrontation matrix.

4.7.1. Proposal of new strategies

In order to reduce weaknesses and mitigate threats, the first group of strategies will be defined (the left top quadrant). Strategic alternatives that allow OEMs to exploit opportunities and offset weaknesses are presented in the right top quadrant. In order to minimize threats by leveraging the strengths, the German OEMs should apply the strategies from the down left quadrant. Finally, strategies from the right down quadrant help reinforce strengths and harness opportunities of the external environment. The strategies elaborated within the scope of this framework will set the focus on inter-firm collaboration as a crucial factor for sustained competitive advantage.

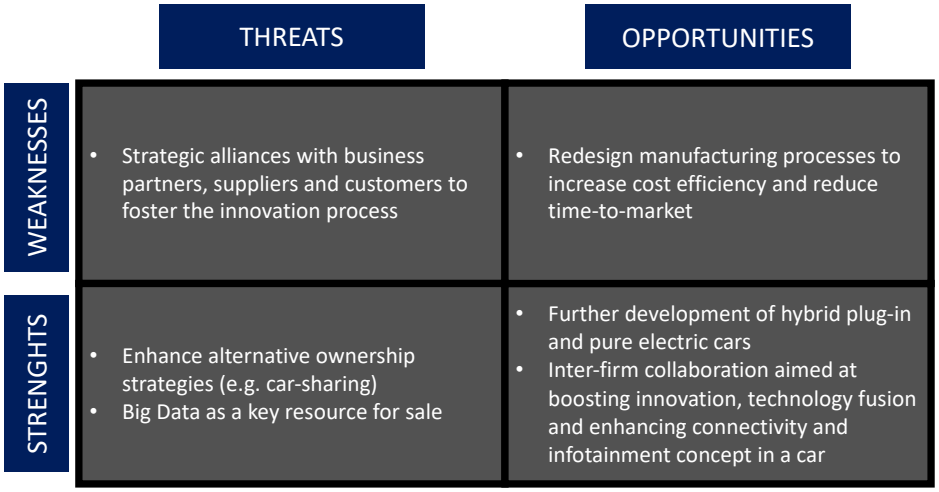

Figure 4.8.: Confrontation Matrix for developing strategies for German OEMs

High labor and raw material costs, such as the battery cells urge German OEMs to integrate with suppliers or establish inter-firm collaboration with the purpose of joint investments in specific assets and knowledge sharing on know-how and new inventions. German automotive industry calls for shorter innovation life cycle and enhanced cost efficiency. In this regard, business processes redesign is supposed to significantly improve the cost structure and reduce the lead time.

The growing number of car sharing users imposes pressures on the OEMs' profit margins. In this regard, OEMs should enhance and expand their own department engaged in car-sharing programs. This strategy will help mitigate the above-mentioned threats and target those under 30-s youngsters who are not willing to own a car with specifically tailored service solutions. Exploiting the potential of Big Data, OEMs are soon to become service providers.

The future of e-mobility is somewhat blurred. As long as gasoline prices stay where they are, proliferation of electric vehicles is supposed to be sped up (McKinsey & Company, 2019).

Furthermore, strict safety standards of carbon dioxide emissions impose additional pressures on car manufacturers. However, the segment of environmentally concerned consumers is expected to grow, once the battery durability is enhanced and the infrastructure is improved. That is, why the transition to e-mobility is the number one priority for all OEMs under investigation. OEMs should also consider the fact that electric powertrains are easier to design, manufacture and service. Moreover, this component is often outsourced, thereby diminishing the value added by a car manufacturer. As a consequence, OEMs should think beyond the usual limits to differentiate one vehicle model from another.

To back up the importance of inter-firm collaborations for German OEMs with empirical evidence, it is necessary to look at the findings of the executives' interviews. Almost all executives stating that collaborations will be extremely important for the trends of connectivity and autonomous driving.

Chapter 5: Conclusion

This chapter briefly summarizes the findings and implications of this study and relates them to the research questions outlined in the methodology and recommendations for future research are given. Finally, the limitations of this study are discussed.

6.1. Observations & Managerial Implications

The overall objective of this thesis was to explore the impact of the current market dynamics on resources and capabilities of German premium car manufacturers as drivers of competitive advantage. In order to be able to answer this question, it is important to understand the success and related core historical core competencies of the OEMs. Coming from that point, it is easier to make a prediction about the prospective core competencies of the future and how German OEMs could keep their competitive advantage. Aiming to achieve these objectives, in-depth interviews with five high-ranked managers from German premium OEMs represent the central element of this investigation. In addition to that, business reports and studies supplemented these interviews and reflected them critically. Here, different frameworks and research methods were executed. In the first step, the industry which falls into the scope of this dissertation was explored, including the major trends at the moment. Secondly, Porter's model of the five forces and the PESTEL analysis got conducted in order to inspect the industry environment as well as the macro-economic forces. The results of both frameworks got integrated into a TOWS matrix in the next step to be able to propose general business strategies in the last step using the confrontation matrix in which the results of the expert interviews also got integrated.

The research findings of this thesis clearly shows that historically, German OEMs are mainly successful due to their strong brand image, which they built throughout the years so they are reknown worldwirde for their very good quality, durability, safety and luxury. Furthermore, they achieved this powerful brand through innovational power, talented employees which internalized high expectations for quality so it is deeply anchored in the culture and more like a collective responsibilty. Also innovational power which is noticeable in the products as well as the overall "made in Germany" brand helped to sharpen the image of premium OEMs. Regarding external factors, their ability to expand in emerging markets connected with the good infrastructure are held responsible for their success.

Coming from that point, the trend analysis and the exploration of the micro- and macro-environment through Porter's five forces and the PESTEL analysis, together with the key take-aways from the expert interviews all points in the direction that OEMs should also strive for a stronger customer focus and a faster subsequent adaptability for changing customer needs which they make possible through a even higher innovative power. This enables OEMs to stay ahead of the stiff competition from Asia and China and help them to win the race of sustainability. In terms of adaptability, the redesign of manufacturing processes to increase cost efficiencies and reduce the time-to-market will play an important role due to the high labor and raw material cost, as well as the need for shorter innovation cycles and lead times in order to keep up with the fierce competition. In terms of sot (sot?) efficiencies, the trend of standardization will be, although it has to be the appropriate amount of standardization because it has a direct impact on product differentiation which is especially important in the premium segment (Satzstruktur ist weird). This challenge will have implications for operation because they need to have a high flexibility to adjust to customer requirements and achieve cutomization even with standardized processes. This can be achieved through postponement and further modularization in the production (Brun, 2009).

If OEMs purposeful try to create these core competencies, it will urge them to engage in cross-industry collaborations, which got widely explored in the literature review, to avoid the threats of new entrants and ensure sustained competitive advantage through the increased innovative power. Also, that would mitigate risks for OEMs. Especially when it comes to trends like connectivity, autonomous driving and the further development of infotainment systems, these cooperations seems imperative to foster innovation. In addition to that, the use of lightweight materials is indicated to play an important role for cutting CO2 emissions of hybrid and ICE cars in the transition phase to pure electric vehicles That is why OEMs already started strategic partnerships with companies that already have expertise in software development like Alphabet, Uber or NVIDIA. Such companies already have a huge know how and enormous capabilities in exactly the field of business which OEMs require in order to cope the actual trends. Also the findings of the literature and the insghts of the interviews coincide in that point.

Due to the radical changes which OEMs are facing at the moment stemming from climate change and pollution through vehicles and the subsequent stronger regulations and policies regarding emissions of CO2 as well as the change in customer need, there is a high pressure towards sustainability. Therefore, the industry is now focusing on alternative sources of energy. Electric vehicles are expected to be the next big technology which will gradually replace the traditional cars with an ICE within the next years.

Although there is still a lack of infrastructure for the proliferation of electric vehicles and the technology is not matured yet, the segment of environmentally-concerned consumers is expected to grow a lot which is why it is imperative to prioritize strategies aiming at expanding the share of electric vehicles. This is corroborated from other studies as well (KPMG, 2019; Deloitte, 2019; Berger, 2018; Porter & Heppelmann, 2014). Therefore, this seems to be the number one priority for OEMs.

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Regarding new mobility solutions, OEMs want to further expand their businesses in possible substitutes to the classical car ownership like e-scooters, e-bikes, public transportation and car-sharing. Contrary to the opinion of various business reports, OEMs' executives do not see a threat in those substitutes yet, because they are just last mile vehicles and can only serve a really small market segment. In the future, when fully autonomous cars will be available, car ownership is expected to decline strongly. However until the advent of fully autonomous vehicles, the feeling of personal freedom in mobility, the convenience and versatility of owning a car seems to outweight advantages of those possible substitutes.

The corona-impact on German OEMs will not affect their major strategies. According to the interviewees, it will only accelerate digitalization projects that they already planned. For instance, a quicker shift to digital car sales and a faster changing of working conditions which includes more mobile working.

I would like to finish this section with a quote of from one of the interviewees which sums it up very fitting: "*The ONE big challenge for us in the future is to handle the complexity which results through all the new challenges"* (Manu).

6.2. Limitations

The scope of the study involves revealing the importance of inter-firm collaborations in the German automotive industry and its influence on the sustained competitive advantage of traditional car manufacturers. This master thesis provides a holistic view on how current macro-environmental and industry-related trends impact firm resources and capabilities, as well as trigger changes in their traditional business strategy in efforts to deal with the market threats.

Yet, this study also has several limitations that could be addressed in further research on the benefits of inter-firm collaborations. The findings of this master thesis are based on major German premium OEMs only.

Although Germany is indeed one of the top worldwide automakers and evolving rivalry of vehicle manufacturers from emerging countries and the USA calls upon the need to analyze the OEMs' competitiveness at the bottom of the pyramid. Some of the findings of this master's thesis may be applicable to other countries, due to the variety of factors that affect the inter-firm cooperation in an industry and a particular country. However, more studies that have been carried out on the basis of the Chinese, Korean, Indian, and Brazilian automotive market will provide depth to the findings of the present study. Furthermore, this paper uses evidence from the interviews of a limited number of executives. Thus, inclusion of wider target audience's responses will add significance to the research findings.

Limited academic attention has been paid to alternative sources of energy like hydrogen or synthetic fuels. With the focus on sustainability, it would be interesting to see the real environmental of the different alternatives in an end-to-end thinking, including the sourcing of the raw materials with its impact on the nature until the end of the lifetime of a car and the recycling. Regarding the ethical issues in handling and sharing personal data within the connectivity models and autonomous driving, the field of literature remains also limited.

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Appendices

Appendix A: Literature overview business models

Author	Title	Year	Journal	Definition Business Model	Components Business Model	Business Model & Strategy
MAGRETTA, J.	Why Business Models Matter	2002	Harvard Business Review	The business model as a system is a description of how the pieces of a business fit together. However, it does not deal with competition	- Value proposition - Customer (target market, scope) - Cost - Economics - Profit	The business model is distinct from strategy. It can be identical for several firms while the firm's strategy is what sets the firm apart from competitors. Competition is he dimension which separates the two concepts from each other.
MAHADEVAN, B.	Business Models for Internet Based E-Commerce : An Anatomy	2000	California management review	A business model is a unique blend of three streams that are crucial to the business. These includes the value stream fort he business partners and the buyers, the revenue stream and the logistical stream	- Value networks (suppliers/partners) - Value proposition - Revenue/pricing - Product/service flows	
MORRIS, M., SCHINDELHUTTE M., ALLEN, J.	The entrepreneur's business model: toward a unified perspective	2005	Journal of Business Research	A business model is a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture and economics are addressed to create sustained competitive advantage in defined markets	- Value network - Strategy - Capabilities/Competencies - Output (offerings) - Financial aspects - Create value - Economics - Competitors	Strategic decision variables are part of the business model which is representation of strategy, architecture and economics work to solve the challenge of sustained competitive advantage
AMIT, R., ZOTT, C.	Value Creation in E-business	2001	Strategic Management Journal	A business model portrays the content, structure and governance if transactions designed so as to create value through the exploitation of business opportunities	- Resources/Assets - Capabilities/Competencies - Information flows - Output (offerings) - Product/service flows - Business opportunities - Create value - Transaction content, governance and structure	
CHESBROUGH, H.; ROSENBLOOM, R.S.	The role of the business model in capturing value from innovation : evidence from XEROX Corporation's technology spin-off companies	2002	Industrial & corporate change	A business model is defined by six attributes: - Articulation of the value proposition - Identification of the markets segment - Definition of the value chain - Estimation of cost structure and profit potential - Description of firm positioning within the value network	-	The business model and strategy are different concepts. The business model focuses on value creation and assumes that knowledge is cognitively limited and biased. Strategy focuses on value capture and sustainability as well as competitive threats. It is value for shareholders that strategy is concerned with as opposed to value for the business

				- Formulation of competitive strategy		
DAVENPORT, T.H., LEIBOLD, M., VOELPEL, S.	Strategic management in the innovation economy: strategy approaches and tools for dynamic innovation capabilities	2006	The way of doing business	A business model is a firm's entire system for creating and providing to customers and earning a profit from that activity as well as benefit its broader stakeholders	- Value network - Value proposition - Strategy - Customer - Capabilities/Competencies - Processes/Activities - Economics - Management - Technology - Legal issues	
HEDMAN J. and KALLIG, T.	The business model concept: theoretical underpinning and empirical illustrations	2003	European Journal of Information systems	The business model is a strategy model which unites the finer aspects of strategy i.e. resource-bases, activities, structure, products, and external factors	- Value network - Customer (target market scope) - Resources/Assets - Value proposition - Capabilities/competencies - Processes/activities - Revenue/pricing competitors - Cost - Output (offer) - Strategy	

OSTERWALDER, A., PIGNEUR, Y., TUCCI, C.	Clarifying business models: origins, present and future of the concept	2005	Communications of AIS	A business model describes the rationale of how an organization creates, delivers, and capture value. A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the values a company offers to ine or several segments of customers and the architecture of the firm and ist network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams	- Customer segments - Value proposition - Channels - Customer relationship - Revenue streams - Key resources	From a strategic point of view the business model concept can help foster innovation and increase readiness for the future through business model portfolios and simulation. The future vision of the company and its strategy are translated into value propositions, customer relations and value networks
SEDDON, P.B., LEWIS, G.P., FREEMAN, P., SHANKS, G.	The case for viewing business models as abstractions of strategy	2004	Communications of AIS	A business model sketches the main detail of a firm's value proposition for its different stakeholders and the activity system the firm uses to create and deliver value to customers	- Value proposition - Strategy - Create value	The business model is an abstraction of strategy that surpasses irrelevant details and capture certain aspects of the firm's strategy. Many firms can have the same business model, but strategy is particular to the individual firm. This is so, because unlike strategy, the business model considers competitive positioning

Appendix B: Template of the expert interview

Research questions

1. What are the effects of market dynamics on firm resources and capabilities as drivers of competitive advantage?

2. What have traditionally been the core competencies of German OEMs in the past?

3. What do OEMs think/predict will be the core competencies of the future?

4. How do OEMs expect to keep their competitive advantage in the future considering the current mega trends and the events of the past 6 months?

Interview Guide:

5. What, in your opinion has or have been the reasons for the success of German premium OEMs in the past? (Maybe: Classification into internal/external aspects)

6. What are your biggest concerns regarding the future? In your opinion, what are the biggest challenges facing OEMs in general, and your company in particular, in the next 5 to 10 years?

7. What have been the biggest changes in the market and in your company in particular, since COVID?

8. Has your strategy changed as a result of COVID, and if so, how did it change your priorities for the future? (near future and more distant future)

9. How do you expect the competitive environment to change for premium segment OEMs in the next 5-10 years?

10. To what extent do you think cars will be replaced/there will be substitutes to car ownership over the next 5-10 years?

    a. (How do you envision the impact of shared mobility and autonomous driving on car ownership? What are the general implications of those trends for your strategy/business model?)

11. What role will continuous standardization, ICE optimization and the use of lightweight material play in the future considering the other mega-trends (evaluated in the questions before)?

12. What is your overall strategy in terms of adapting to current trends? How does this vary for the cheaper vs the more expensive car segments?

Appendix C: Coding Dictionary

Code dictionary	Definition
Past core competencies	
Brand image	Participants describe how German-made premium cars are perceived internally and internationally e.g. luxury, durability and safety.
Innovation	Participants talk about new things they are developing- such as iDrive- to meet the changing consumer needs
Marketing capability	Participants talk about their perceived ability to establish a global presence and visibility
Talent	Participants states that German OEMs attract and retain highly qualified professionals, particularly engineers
Quality control	Participants describe the strategies German OEMs put in place to produce quality premium cars e.g. developing key performance indicators and fostering a learning culture
Emerging markets	Participants describe strategies that German OEMs are using to venture into markets beyond the national and regional borders such as establishing production plants in different countries
Good infrastructure	Participant talks about the existing infrastructure as an enabler for the production of quality premium cars
Core competencies of the future	
Adaptability	Participants allude to the fact that continuously adjusting organizational operations is critical to business survival in the ever changing micro and macro business environment
Economic	Participants allude to stiff competition from new entrants such as Asian and America-based auto companies
Environmental	Participants discuss the global focus on climatic changes and the contribution of transport industry to the carbon footprint

Code dictionary	Definition
Political	Participants talk about policies that are likely to cause a shift in the transportation industry such as laws and policies limiting CO2 emission and laws banning entry of vehicles into urban centres
Social	Participants talk about rural-urban migration and its impact on car ownership
Technological	Participants the shift to electric and autonomous cars
Customer focus	Participants discuss processes being adopted by German OEMs to respond to changing customer expectations e.g. ICE-optimization to make cleaner fuels and reach the customer demands of eco-friendly technologies
Innovative power	Participants perceive the ability to develop affordable and clean energy solutions-such as synthetic fuels- as critical for German OEMs
Competitive advantage	
Collaborative business models	Participants talk about the need to establish strategic partnerships, particularly with tech companies, to improve the innovation capacity of German OEMs
Mobility solutions	Participants describe a need to shift the core business on German OEMs i.e. from being car producers to offering mobility services to respond to the growing demand for complimentary services such as e-scooters and car sharing
Sustainability-based models	Participants describe approaches German OEMs are using to remain profitable and survive pandemics e.g. digitalization and cost-benefit analysis

Appendix D: Business Model Environment

Macroeconomic Forces	Global market conditions	- Global recession - Slower growth in BRIC - High uncertainty and very volatile due to COVID-19
	Capital markets	- High uncertainty due to COVID-19
	Commodities and other resources	- Fierce competition for top IT talents - Volatile oil prices - Rising commodity prices (especially high prices for battery cells)
	Economic infrastructure	- Ranges substantially among different countries in which the OEMs operate
Market Forces	Market issues	- Strongly increasing car maintenance cost - Emphasis in cities shifting from car- ownership to car-sharing - Emerging markets gaining in importance
	Market segments	- Generation Y obsessed with connectivity - Super Premium segment seems promising due to higher possible profit margins - Distributors, car-rentals, insurers - Strong potential in emerging markets
	Needs and demands	- Need to manage Big Data and stay connected - Greener technologies and subsequent demand for e-vehicles - Governmental mandates for increased road security - Large unsatisfied mobility needs in emerging markets - Need to manage city congestion
	Switching costs	- High switching costs for customized vehicles - Car-sharing reduces the switching costs - Growing amount of information available online
	Revenue and attractiveness	- High margins on patent-protected in-car tech fringes - Low margins on conventional vehicles, higher margins in Super premium segments and in mid-term also for electric vehicles - IT and telecom providers enjoy growing impact on prices
Industry Forces	Competitors	- Several large and medium size players - Increasing trend toward consolidation with suppliers within supplier parks
	New entrants	- Main new entrants are from Asia and USA - Augmenting trend of IT and telecom companies becoming new incumbents
	Substitutes	- Car-sharing - Pay-per-use scooters, e-bicycles
	Suppliers and other value chain actors	- IT and telecom providers are growing in importance - Insurers, banks, car rentals - Supplier parks
	Stakeholders	- Shareholders` pressure forces the OEMs to focus on short-term financial results - Governments oblige the OEMs to follow new road security and vehicle emissions standards - Customers' reluctance to pay for tech fringes urge the OEMs to share the costs with suppliers - Suppliers gain in bargaining power as connectivity and telematics become a more important differentiating factor in purchase decision
	Technology trends	- Major advances in in-car connectivity, telematics and infotainment - Emergence of new means to handle Big Data

		- Further development of e- mobility - Development of new lightweight materials - Development of hydrogen technologies and alternative fuels
	Regulatory trends	- Governmental mandates to increase road security with embedded telematics (e.g. e-Call, SVT etc.) - Governmental regulations for vehicle emissions
	Societal and cultural trends	- Customers increasingly conscious of environment - Hyper-urbanization leads to de- motorization - Generation Y obsession with ubiquitous connectivity
	Socioeconomical trends	- Shrinking disposable income - Growing middle class in emerging markets