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Business Model Design - A Matter of Perspective?

A Qualitative Study on the Significance of Business Model Components in the Context of Electric Vehicles in the German Automotive Market

Master Thesis

by

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Abstract

The shift from internal combustion to electric engines is currently transforming the automotive industry. Yet, the business model path forward for electric vehicles (EVs) is still uncertain, as the perspectives of different industry actors, especially incumbents and new entrants deviate. The understanding of varying views regarding business model design thus needs to be intensified. Therefore, the purpose of this research is to provide new insights into the perspectives of important business model components and factors driving business model innovation in the context of e-mobility. Based on a multiple-case study conducting semi-structured interviews with three groups of market participants, German premium OEMs, industry experts, and Chinese EV companies, the study evinces disparities and similarities between different strategic perspectives.

The findings reveal the industry experts' perspective to be primarily in line with the existing literature, holding an external, holistic view on the changing ecosystem and the associated business model. While the surveyed German incumbents appear to mostly acknowledge the importance of strategic partnerships as well as a necessity towards customer-centricity, the Chinese new entrants emphasize a compelling value proposition as the most crucial business model component. The study further identifies external factors and an organization's condition, depicting its current resources and historically determined legacy, as significantly impacting the business model for electric vehicles.

This research contributes to the literature by developing a juxtaposition of strategic perspectives, stressing that differences in the perception of business model components' weightings and additional external factors need to be considered. For practitioners, the study suggests strengthening and creating new partnerships. German incumbents are reminded to heed new entrants' potential to disrupt the market, whereas Chinese new entrants need to particularly address the challenges related to their lack of organizational foundation, on which to build up market share in a mature market.

Keywords: Business Model; Business Model Innovation Drivers; Automotive Industry; EV

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List of Abbreviations

ACES	Autonomous, Connectivity, Electrification & Shared Mobility
BEV	Battery Electric Vehicle
BM	Business Model
BMI	Business Model Innovation
BMC	Business Model Canvas
EV	Electric Vehicle
IT	Information Technology
ICE	Internal Combustion Engine
ICT	Information and Communications Technology
NEV	New Energy Vehicles
OEM	Original Equipment Manufacturer
OES	Original Equipment Supplier
OTA	Over-the-Air
PHEV	Plug-in Hybrid Electric Vehicle
RQ	Research Question
TCO	Total Cost of Ownership
TD	Technical Development
V2G	Vehicle-to-Grid

1 Introduction

"The reason why it is so difficult for existing firms to capitalize on disruptive innovations is that their processes and their business model that make them good at the existing business actually make them bad at competing for the disruption" (Christensen, 2011, par.9).

Christensen (2011), widely known for his theory on disruptive innovation, reviews how incumbent firms regularly struggle and fail to react to emerging technologies and a changing market landscape. An expedited trend of disruptive technologies and new business models (BM) revolutionizing industries could be witnessed in the past years. Driven by digitization, sustainability policies, changing customer preferences, and not least the disruptive megatrends *autonomous*, *connectivity*, *electrification*, and *shared mobility* (ACES), the competitive landscape, particularly in the automotive sector, is facing changes (McKinsey, 2016). In the midst, headlines of the once most innovative and largest market in the automotive industry, Germany, are surfacing as lagging behind in the electric car race (Preuß, 2020). Yet, according to Zarazua de Rubens, Noel, Kester and Sovacool (2020), electric vehicles (EVs) are inevitably next in line of becoming a widely diffused automotive technology. Technological progress is moving at a rapid pace (Nieuwenhuis, Cipcigan & Sonder, 2020), so how are the market's incumbents keeping up?

Interestingly, electric vehicles are not a new technology. Original equipment manufacturers (OEMs) have been conducting research on electric engines for decades. During the 20th century, the interest in EVs rose in the Second World War, when oil was limited, as well as in the late 1960s and 1970s, when concerns about air pollution increased (Nieuwenhuis, Cipcigan & Sonder, 2020; Kley, Lerch & Dallinger, 2011). In both periods, EVs did not manage to gain a foothold, as either restrictions were lifted or incumbents improved their combustion engine technology (Nieuwenhuis, Cipcigan & Sonder, 2020). However, increasing awareness of depleting resources, climate change and the impact of CO2 from fossil fuel on the environment is once again putting EVs in the public interest (Kley, Lerch & Dallinger, 2011). In 2019, the European Commission adopted the *Green Deal*, which introduced a set of policies with the aim for the EU to become climate neutral by 2050 (European Commission, n.d.). In order to reduce CO2 emissions a penalty

for car manufacturers, in the form of a CO2 cap for newly sold cars of 95g CO2 per kilometer, had been implemented (Stegmaier & Harloff, 2021). This resulted in the Volkswagen Group paying a 100 million euros fine in 2020 (FAZ, 2021). Hence, car manufacturers face political pressure to manage this technology shift, inevitably forcing business model innovation (BMI). According to Tongur & Engwall (2014), "the critical challenge for a company facing a technology shift is overcoming the technology shift as such, while simultaneously crafting a business model matching the unknown competitive context after the shift" (p.525). Furthermore, new market entrants such as Tesla are agitating old automotive industry patterns, and several Chinese EV startups have announced their market entry into Europe, driving BMI in the industry (Hongpei, 2021).

Throughout history, examples of companies succeeding and failing as a result of BMI could be witnessed. Nestlé introduced a razor-blade business model to create high margins on the coffee capsules compatible with their, in contrast, low-priced Nespresso machines (Björkdahl & Holmén, 2013). Apple built a breakthrough business model around the iPod (Afuah, 2014). These are just two examples of how BMI promotes non-superior products and creates a sustainable competitive advantage. Conversely, this means not performing BMI within an organization can become critical (Christensen & Johnson, 2009; Christensen, 2011).

When looking at the automotive industry, the business model path forward for electric vehicle technology is uncertain, as the technology of e-mobility is still developing and continues to move forward (Abdelkafi, Makhotin & Posselt, 2013; McKinsey, 2014). The transition from the internal combustion engine (ICE[1]) to EVs therefore represents an interesting case to study BMI, as the industry has yet to establish a business model that attracts a large customer base (Budde Christensen, Wells & Cipcigan, 2012; Kley, Lerch & Dallinger, 2011; Abdelkafi, Makhotin & Posselt, 2013).

[1] ICE describes the currently common drive technology in passenger cars, i.e., using diesel/gasoline to fuel an internal combustion to generate drive. Throughout this thesis, ICE is used as a synonym for ICE vehicles, unless otherwise implied.

1.1 Problem Statement

Present contributions have already identified gaps in the BMI literature. Foss and Saebi (2016) argue that while the scope of literature on business model innovation has been properly established within the past decades, more detailed academic research on the construct is still scarce. This, they explain, refers primarily to dimensionalizing the concept, its antecedents, consequences, potential moderators, and further its boundary conditions. Delimiting the topic to the literature on BMI in the automotive sector, with a focus on EVs, it can be observed that the business model literature, especially the literature on business model innovation regarding the EV market, appears to be scarce. We thus follow the call of various scholars to contribute to the field of BMI in the automotive industry. Bohnsack, Pinkse and Kolk (2014) state that observing the further developments in EV BMs is crucial as an increasing number of firms are moving into this industry and electric mobility represents a highly dynamic field where a regular review of BMI and adaptation to specific markets is necessary (Krommes & Schmidt, 2017). Abdelkafi, Makhotin and Posselt (2013) offer valuable insights into emerging BMIs in the electromobility field, however, the lack of expert interviews with practitioners and researchers is considered a shortcoming that we aim to address with this research.

The current business models utilized in the (German) automotive industry do not match new energy vehicle technology, especially EVs. Various factors, such as the lack of charging infrastructure or the consumer skepticism towards EV technology, define obstacles that need to be tackled through novel approaches (Kley, Lerch & Dallinger, 2011; Williander & Stålstad, 2013). For slow-moving OEMs, this could result in a rapid exit from the race for market share. Yet still, too many open questions regarding the above-mentioned challenges exist to benefit from the potentially large EV profit pools (Mosquet, Arora, Xie & Renner, 2020).

Although the German automotive industry has always been able to impress in recent decades with the construction and constant optimization of internal combustion engines (Meyer, 2020), German OEMs long seem to have underestimated the urgency of transforming their current business models (Ludowig, 2020). Bormann, Fink, Holzapfel, Rammler, Sauter-Servaes, Tiemann, Waschke and Weirauch (2018) question whether the German automotive industry even realizes and acknowledges the current potential of EVs and whether they might already be too late to

capture it. Existing literature on BMI in the context of e-mobility has so far focused mainly on the Chinese market (e.g., Wang & Kimble, 2012; Xue, You, Chen & Kong, 2013; Shao, Xue & You, 2014; Kong & Bi, 2014; Li, Zhan, Jong & Lukszo, 2016; Hou & Li, 2020) or on a single company such as BMW (e.g., Kukkamalla, Bikfalvi & Arbussà, 2020). Moreover, academic literature strongly focuses on consumer awareness and perception (e.g., Jin & Slowik, 2017; Higueras-Castillo, Kalinic, Marinkovic & Liébana-Cabanillas, 2020; Egbue & Long, 2012; Haustein & Jensen, 2018), however, the opposite perspective (e.g., OEMs, potential new entrants, suppliers) on the shift in technology, respectively the transition in business models, is presently primarily addressed by industry reports of consultancies (e.g., Accenture, 2021; Küpper, Kuhlmann, Tominaga, Arora & Schlageter, 2020; Woodward, Walton & Hamilton, 2020). Accordingly, industry experts appear to be able to provide a more up-to-date external view that is worth exploring. The purpose of this study is therefore to provide new insights into these varying perspectives to create a deeper understanding of important BM elements and factors driving BMI in the context of e-mobility.

1.2 Research Question and Purpose

Building on the described problem statement, the purpose of the study can be further elucidated. Firstly, this contribution strives to enhance the understanding of how perceptions on BM design differ, as the literature seems to not have particularly addressed similarities and disparities among different views. As elaborated in the problem statement, the current BM of OEMs is not suitable for EVs, therefore BMI depicts an important endeavor for companies. As pointed out by Kley, Lerch and Dallinger (2011), BMI in the context of an emerging industry is a dynamic field that requires constant investigation. Thus, the practical purpose of this thesis is to enhance the understanding different industry participants have on a potential EV BM design for OEMs concerning electric vehicles.

Reflecting on the research purpose leads to the following research question (RQ):

How do strategic perspectives of industry experts, incumbent, and new entrant OEMs differ on the significance of business model components and their drivers in the context of electric vehicles?

A multiple-case study approach is used to address this RQ, exploring the different views of industry participants on the inevitable transformation of the current business model. The methodology section provides further elaborations on the applied approach.

1.3 Significance for Strategic Management

Apart from the fact that many practitioners and the academic literature often mistakenly equate the construct business model with the term strategy (Morris, Schindehutte & Allen, 2005), there are many overlaps to be considered. Baden-Fuller and Morgan (2010) argue that most managers' definition of 'strategy' includes mentioning the business model. This is even though, as claimed by Porter (2001), the business model itself is no strategy, but merely a tool or framework for strategic purposes. Yet, it seems deeply ingrained in the common understanding of strategy and is, for that reason alone, pertinent to strategic management. Furthermore, as business models affect a firm's possibilities for value creation and capture, researching them is particularly significant for both practical and academic purposes (Amit & Zott, 2001).

What can currently be seen in many industries is a fundamental change in strategy, especially as emerging technologies such as EV technology and an increase in digitized products and processes come along (Wirtz, 2020). This change goes hand in hand with the transformation of business models, as they depict a reflection of an organization's realized strategy (Casadesus-Masanell & Ricart, 2010). In this sense, further research on BMI in the context of EVs is significant for strategic management. The audience to be addressed with this study can thus primarily be defined as incumbents in ICE technology, who are directly impacted by the transition in the market. They find themselves in need of innovating their business models, which also includes adjusting their strategies. Naturally, the implications provided in this thesis are further relevant for new market entrants.

1.4 Thesis Outline

Subsequent to the introduction, the literature review in chapter two first provides an overview of previous research, models, and theories on business models and business model innovation to solidly locate the reader in the secondary sources (Hofstee, 2006). To this end, literature is primarily drawn upon the strategic management domain. Nonetheless, other areas are taken into account. Following this, literature on business model innovation in the automotive sector is examined, narrowing down the research field to the area of interest and, later on, serving as a lens for the inquiry (Creswell & Creswell, 2018). Chapter three elaborates on the research methodology underlying the study. Research design and process are introduced and substantiated. Further, the method deployed for analyzing the collected data is explained. In the fourth chapter, the study's empirical findings are highlighted. The discussion of the obtained results, especially in the context of the reviewed literature, is subsequently led in chapter five, concluding with frameworks illustrating the most important EV business model components and drivers. Further, the section elaborates on the differences between the preliminary framework, introduced in the literature review, and the final frameworks. Lastly, chapter six seeks to conclude by first briefly reviewing the thesis' aim, key findings, and interpretations. In a second step, theoretical and practical contributions to the field of strategic management are elaborated and, finally, the limitations underlying the study are elucidated.

2 Literature Review

The literature review aims to provide insight into options that help to limit the scope of the study to the needed area of inquiry (Creswell & Creswell, 2018). Moreover, it creates the base for relating this study to the consecutive dialogue on business model theory in the literature (Cooper, 2010). In the following subsections, underlying concepts are elaborated to ensure a common understanding throughout the thesis. As a preliminary framework is established based on the reviewed contributions at the end of this chapter, the literature review further creates the foundation for this empirical study.

2.1 Business Models

Since the early 1990s, business model theory has been the focus of considerable attention of both practitioners and academics (Zott, Amit & Massa, 2011; Björkdahl & Holmén, 2014). Over the past two decades, a significant increase in interest could be observed (Foss & Saebi, 2016). This can be argued through the remarkable changes in competitive conditions; globalization and faster innovation cycles have accelerated market dynamics and complexity (Wirtz, 2020).

The theory within the field of strategic management is broad, yet the term business model is hardly clearly defined (Morris, Schindehutte & Allen, 2005; Chesbrough, 2007; Zott, Amit & Massa, 2011; Wirtz, 2020). Reviewing the literature, however, leads to the assumption that there is consensus that the concept of business models generally defines *how* firms do business to create and capture value (e.g., Richardson, 2008). The research on BMs has primarily developed in three silos: *e-business*, *strategic issues*, and *innovation & technology management* (Zott, Amit & Massa, 2011). Furthermore, four emerging themes are highlighted by Zott, Amit and Massa (2011):

- Business models representing a new unit of analysis
- Business models emphasizing a system-level, holistic approach to defining how companies conduct business
- The significant role of activities of focal firms and their partners in conceptualizing BMs

- Business models seeking to explain value creation and capture

These themes become more apparent in the following sections. To first establish an understanding of the term business model within the scope of this study, selected perspectives on definitions are subsequently discussed.

2.1.1 Perspectives on Business Models

Originating in the field of business strategy, the business model is now a widely discussed concept understood as an integrative framework for strategic management, i.e., for formulating and executing strategy (e.g., Richardson, 2008; Morris, Schindehutte & Allen, 2005; Amit & Zott, 2001, Zott & Amit, 2008). As condensed by Morris, Schindelhutte and Allen (2005) as well as Zott and Amit (2001), the construct is initially composed of a range of central ideas prominent in business strategy, such as Porter's *value chain concept* (1985), the *resource-based view* (Barney, Wright & Ketchen, 2001; Barney, 1991), the *strategic network theory* (Jarillo, 1995), Dyer and Singh's *corporate strategies* (1998), Barney's *theory on boundary decisions* (1999), as well as the *transaction cost theory* (Williamson, 1981). The essence of a business model, Teece (2010) argues, lies in its ability to define "the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit" (p.174). He provides a rather concise definition of the business model, describing it as the "design or architecture of the value creation, delivery, and capture mechanism" (p.191). The comprehensive research on BM literature by Foss and Saebi (2016), however, concludes that the definitional convergence among the contributions approaches this exact definition. An overview of further definitions is provided in the following.

In the dawn of the digital age and the associated adapted ways of conducting business, the theory on business models has been broadened. In this context, Amit and Zott (2001) define the business model as a framework for *efficiency*, *complementarities*, *lock-in*, and *novelty* to determine the logic of value creation. They identify these elements as primary value drivers and particularly emphasize

that value creation in e-business[2] extends the possibilities drawn from the central ideas BM theory is built on. In a later publication, Zott and Amit (2007) denote the business model as "a structural template describing the organization of a focal firm's transactions with all of its external constituents in factor and product markets" (p.1), implying a specific focus on firm transactions, i.e., firm activities. This is echoed by Zott and Amit's (2010) research on BM design, in which the authors tie in with their 2001 study and define the BM as "a system of interdependent activities that transcends the focal firm and spans its boundaries" (p.216). In this context, a significant role in conceptualizing a business model is played not only by a firm's activities but also by its strategic partners' activities (Zott, Amit & Massa, 2011; Amit & Zott, 2015).

Christensen and Johnson (2009) describe the business model as a construct of four interlocking, interdependent elements creating and delivering value when taken together, and thus initiate an attempt to label the BM's different components.

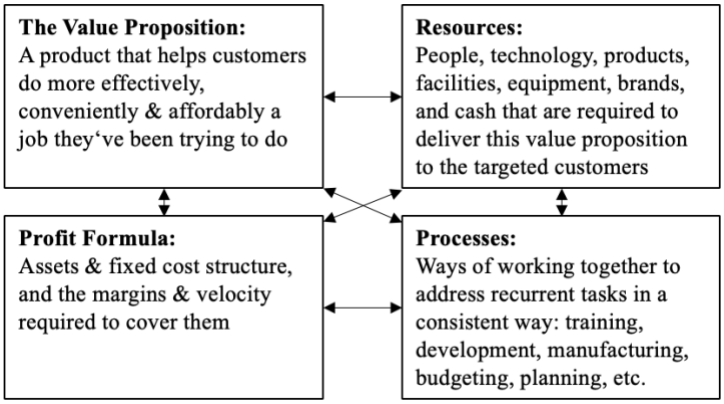

Figure 1: *The four interlocking elements of a business model (Christensen & Johnson, 2009, p.2)*

As indicated by the bidirectional arrows, the elements can be arranged in different ways, depending on the circumstances underlying the respective business and its offering(s) (Christensen & Johnson, 2009).

[2] E-business refers to "a business management method using IT communication, mainly Internet applications" (Brzozowska & Bubel, 2015, p.1095). This comprises "sending documents, exchanging data between a producer, distributor and trade partner, winning new customers, conquering markets, and holding teleconferences" (Brzozowska & Bubel, 2015, p.1095) via the internet.

A prominent framework is the Business Model Canvas (BMC) by Osterwalder and Pigneur (2010). It may be argued that the model is therefore widespread because it combines different perspectives of other contributions to the business model literature (e.g., *value proposition* or *resources* mentioned by Christensen & Johnson, 2009) and maps most organizations' key activities. The nine building blocks "cover the four main areas of a business: customers, offer, infrastructure, and financial viability" (Osterwalder & Pigneur, 2010, p.15), which can to an extent be related to the previously discussed perspectives. Osterwalder and Pigneur (2010) define a BM as "the rationale of how an organization creates, delivers and captures value" (p.14). The BMC, on the other hand, they describe as "a shared language for describing, visualizing, addressing, and changing business models" (p.12).

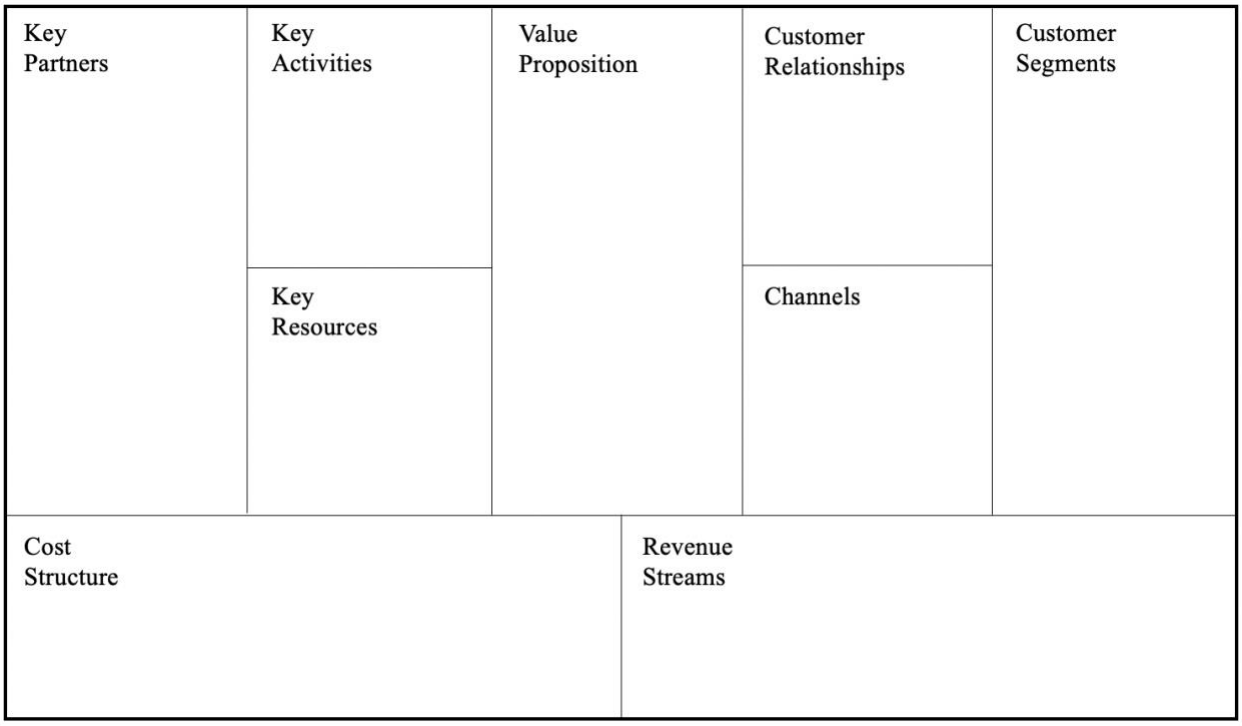

Figure 2: *Business Model Canvas Template (Osterwalder & Pigneur, 2010, p.44)*

The nine building blocks are defined as follows:

Table 1: *Definition of the BMC building blocks (created by authors based on Osterwalder & Pigneur, 2010, p.20ff.)*

Building Block / Component	Definition
Key Partners	"The Key Partnerships Building Block describes the network of suppliers and partners that make the business model work" (Osterwalder & Pigneur, 2010, p.38)
Key Activities	"The Key Activities Building Block describes the most important things a company must do to make its business model work" (Osterwalder & Pigneur, 2010, p.36)
Key Resources	"The Key Resources Building Block describes the most important assets required to make a business model work" (Osterwalder & Pigneur, 2010, p.34)
Value Proposition	"The Value Propositions Building Block describes the bundle of products and services that create value for a specific Customer Segment" (Osterwalder & Pigneur, 2010, p.22)
Customer Relationships	"The Customer Relationships Building Block describes the types of relationships a company establishes with specific Customer Segments" (Osterwalder & Pigneur, 2010, p.28)
Customer Segments	"The Customer Segments Building Block defines the different groups of people or organizations an enterprise aims to reach and serve" (Osterwalder & Pigneur, 2010, p.20)
Channels	"The Channels Building Block describes how a company communicates with and reaches its Customer Segments to deliver a Value Proposition" (Osterwalder & Pigneur, 2010, p.26)
Cost Structure	"The Cost Structure describes all costs incurred to operate a business model" (Osterwalder & Pigneur, 2010, p.40)
Revenue Streams	"The Revenue Streams Building Block represents the cash a company generates from each Customer Segment" (Osterwalder & Pigneur, 2010, p.30)

More recent perspectives, such as Wirtz (2020), agree on the widely distributed definition of the BM as a system of activities, stating that the "business model depicts the operational production and service systems of a company" (p.3). Exactly how these systems are constructed and what components are leveraged to create a BM are examined in the subsequent chapter.

2.1.2 Design and Functions

The design of a business model depicts a key decision for managers of new businesses and an equally crucial task for managers in existing organizations, Zott and Amit (2010) claim. In this regard, they discuss two building blocks that need to be considered when designing a model: First, specific *design elements* describing its architecture, such as content, structure, and governance. Second, *design themes* (i.e., *efficiency*, *complementarities*, *lock-in*, and *novelty*) describing the sources of the activity system's value creation. Each activity system (i.e., BM) implies a specific set of activities, resources, and capabilities (Zott & Amit, 2010), emphasizing that each organization requires a custom-made business model. The starting point of the design should thus be a particular organization (Amit & Zott, 2001). Morris, Schindehutte and Allen (2005), who studied numerous contributions to BM literature, conclude that the number of components a BM should have ranges from three to eight elements. Predominantly, they explain, the offerings and associated activities (i.e., the value proposition) are mentioned amongst these components.

In conformity with what has been elaborated in the course of this literature review, Chesbrough (2007) argues that a BM's two primary functions are value creation and value capture. This is echoed by Achtenhagen, Melin and Naldi (2013), studying how companies change and adapt their business models in order to attain sustained value creation. They likewise consider the main function of the business model to be value creation. Richardson (2008), on the other hand, describes the primary purpose of strategy frameworks, to which the concept of the business model pertains, as enabling "the strategist to apply general principles to the firm's specific situation and come up with a good theory of how the firm should compete. Armed with a good theory, the strategist must put it to the test through implementation or execution" (p.133f.). He further elaborates on a strategy framework's function to allow the abstraction from detail to only capture essential elements of competition, which can be related to the main function of an economic model:

a simplified image of a section of economic reality (Schips, 1990). Thus, despite offering an extensive view of an organization's way of doing business, Richardson (2008) emphasizes that the business model should not be understood as a comprehensive description of the ecosystem a firm operates in (i.e., including all actors, relationships, and processes). Chesbrough and Rosenbloom (2002), who claim that the ultimate role of a BM is "to ensure that the technological core of the innovation is embodied in an economically viable enterprise" (p.25), further formulate a set of six generic functions. According to them, a BM should define the *value proposition*, *market segment*, *value chain structure*, *cost and profit structure*, as well as elucidate a *company's position within their value network* (i.e., considering customers, suppliers, competitors, etc.) and formulate a *competitive strategy*. In line with this, Morris, Schindehutte and Allen (2005) elaborate six questions underlying a BM, each one of them addressing a specific component. These questions can also be translated into functions (Table 2).

Table 2: *Six questions underlying a business model (created by authors based on Morris, Schindehutte & Allen, 2005)*

Question	Component	Function
● "How do we create value?" (Morris, Schindehutte & Allen, 2005, p.730)	Component 1 - Factors related to the offering	Define value creation through value proposition
● "Who do we create value for?" (Morris, Schindehutte & Allen, 2005, p.730)	Component 2 - Market factors	Conduct market/customer segment analysis
● "What is our source of competence?" (Morris, Schindehutte & Allen, 2005, p.730)	Component 3 - Internal capability factors	Conduct resource-based view analysis (Barney, Wright & Ketchen, 2001)
● "How do we competitively position ourselves?" (Morris, Schindehutte & Allen, 2005, p.730)	Component 4 - Competitive strategy factors	Conduct competitive analysis
● "How [do] we make money?" (Morris, Schindehutte & Allen, 2005, p.730)	Component 5 - Economic factors	Conduct economic analysis
● "What are our time, scope, and size ambitions?" (Morris, Schindehutte & Allen, 2005, p.730)	Component 6 - Personal/investor factors	Stake out framework conditions

As the functions of a BM concern an organization's key activities, an important role is attributed to it, leading to companies feeling pressured to improve their BM - to innovate it.

2.2 Business Model Innovation

"Today, innovation must include business models, rather than just technology and R&D" (Chesbrough, 2007, p.12).

At an early stage, Chesbrough (2007) understood the importance of business models in the context of innovation. He claims that a great BM trumps a great technology. This is to say that an inferior technology would create more value being commercialized through a mediocre business model than a better technology marketed through an inferior business model would (Chesbrough, 2006; 2007; 2010). As technology innovation by itself cannot succeed in the market, suitable business models to fully exploit commercial potential are crucial (Chesbrough, 2010). To match a BM to a new technology/product, it thus requires BMI. Especially within the context of information technology (IT) and the associated shifts in various technology sectors, numerous BMIs can be observed. E-business and the increasing use of data drastically force rethinking old patterns and require businesses to become more customer-centric (Teece, 2010).

The literature on BMI provides less confusion about defining the term than the literature on BMs. Amit and Zott (2015) break it down by saying that BMI "can consist of adding new activities, linking activities in novel ways or changing which party performs an activity" (p.36). Pursuant to Massa and Tucci (2013), there is a consensus that BMI can be understood as the act of innovating a business model as well as the act of creating a new business model for a technology innovation. The BM, argue the authors, "represents an important *vehicle* for innovation" (p.420) and at the same time "a new dimension of innovation" (p.420). Abdelkafi, Makhotin and Posselt (2013) argue that BMI describes when at least one of a BM's dimensions (components) is modified, which leads to the question of when BMI occurs and for what reasons.

2.2.1 Drivers of BMI

According to Christensen and Johnson (2009), BMI is primarily triggered by disruption, which occurs in business models whenever an enabling technology makes it simpler and more affordable for another set of people to own and use a product. As they explain, there are two opportunities driving BMI: *new market disruption* and *low-end disruption*. The former takes place "when there is another, broader circle beyond the one being served at present" (Christensen & Johnson, 2009, p.6), i.e., in a new market. This, they state, describes "a population of people who are trying to do a particular job, but have to put up with inconvenient, cobbled-together solutions because nobody has created a product that is simple, affordable and convenient enough" (p.6f.). Low-end disruption, on the other hand, occurs when a sustaining technology's performance requirements of customers with few demands are overshot. A disrupting technology following an upward performance trajectory, that enters the market, can then easily take over said customers with little demands (Christensen & Johnson, 2009). Thus, disruption is generally defined as "a process whereby a smaller company with fewer resources is able to successfully challenge established incumbents' businesses" (Christensen, Raynor & McDonald, 2015, p.4). An issue with disruption theory, Christensen, Raynor and McDonald (2015) emphasize, is that people are too quick to label innovations as disruptive, whenever a market is shaken up or incumbents struggle, even if these innovations do not originate in low-end or new-market footholds. Besides disruption, other key factors driving BMI are the emerging knowledge economy, the expansion of the internet and e-commerce, outsourcing and offshoring activities, as well as the general reorganization of the financial services sector (Teece, 2010).

There are several reasons why BMI matters to managers, entrepreneurs, and academics alike. Firstly, Amit and Zott (2015) argue, BMI depicts an often-unexploited source of future value. Secondly, they perceive the BM to be more difficult for competitors to imitate than a single technology/product. It is in accordance with Teece (2010), that they mention the possibility for BMI to create a sustainable performance advantage. Finally, the authors explain, the importance of BMI results from its power. As an often underutilized, yet widely known strategic tool, managers need to be aware of the possibility of competitors trying to attack also from "outside their traditional industry boundaries" (Amit & Zott, 2015, p.37). As most organizations tend to act more in the operations sector of their business, Amit and Zott (2015) elaborate, the BM is where

companies need to improve and innovate: “business model choices often go unchallenged for a long time” (p.36). Besides providing positive prospects for a business, BMI becomes crucial especially once it fails or is neglected by the management. As argued by Christensen and Johnson (2009), the disregard or failure of BMI is the main reason for market leaders to be overrun by others confronting them with disruptive technologies. In this regard, they also claim that not successfully engaging in BMI impedes corporations' further development. This leads to discussing the factors preventing BMI.

2.2.2 Factors Preventing BMI

One of the questions discussed in the literature is why many organizations hesitate to innovate their business models if BMI is said to create a sustainable competitive advantage. Chesbrough (2007) elaborates on factors preventing BMI: What is termed the *business model innovation leadership gap* describes the lack of managing resources to lead and drive BMI. He argues that organizations tend to put general managers on two-to-three-year rotations, yet more time is required to develop and conduct business model experiments, obtain the results, interpret, and understand them. Responsible managers further need to fully understand their business model before they can innovate it (Chesbrough, 2007). It requires managers who broaden their perspectives to find the right business model to capture value from their technology (Chesbrough & Rosenbloom, 2002).

Another factor argued by Chesbrough (2007) is *inertia*. He explains that when managers reach their current level of responsibility while executing their work through an already established business model, inertia is amplified. This is echoed by Zott and Amit (2010), stating that the main challenge is not to fall into organizational inertia and refuse to change existing business models. This often also yields path dependency, which especially large, established organizations can hardly break out of. In accordance with Zott and Amit (2010), Chesbrough and Rosenbloom (2002) elaborate that a successful business model “constrains the subsequent search for new, alternative models for other technologies later on” (p.2). Thus, constantly renewing and adapting a business model to contingencies is a crucial condition to create value consistently (Achtenhagen, Melin & Naldi, 2013). In this regard, Chesbrough (2007) provides suggestions the management can follow:

- Supply the right resources and authority to senior management to define and conduct BM experiments. This requires collaborating with other parts of the organization and often involves competing for resources for the established and the new model.
- Ensure BM experiments are internally protected, i.e., they should not directly compete with other initiatives within the organization through one funding pool.
- Check whether a potential BM is scalable and can function at a higher volume.

Concluding, it can be noted that business models need to be *dynamic*. "Business model innovation is not a matter of superior foresight ex ante", Chesbrough (2010, p.356) argues, but calls for significant trial and error as well as some adaptation ex post. Having established a first understanding, the discussed concepts are elaborated within the context of electric mobility in the following chapter.

2.3 BMI in the Automotive Industry in the Context of Electric Mobility

The shift from internal combustion engines to electric vehicles can be described as a radical innovation, as it creates new domains and criteria yielding a major change in the industry (Norman & Verganti, 2014; Weider & Rammler, 2011). In fact, it implies a discontinuity with the past and changes the way business is conducted in the industry (Norman & Verganti, 2014). "[Battery Electric Vehicle] BEV[3] is a radical innovation that cannot replace ICE cars […] and thus is a technology with high transformative capacity" (Augenstein, 2015, p.20). However, whether EVs are a disruptive technology can be questioned since they fulfill the same function of transport as a conventional car (Weider & Rammler, 2011) and do not fit in Christensen and Johnson's (2009) definition of a disruptive innovation[4]. While the field of electric mobility is broad and encompasses multiple actors from the transport sector to energy and utility companies as well as information and communications technology (ICT) companies, this review is limited to OEMs, with a focus on the downstream business[5], considering that "the commercialization of EVs has been ineffective

[3] Battery Electric Vehicles are vehicles that are solely powered by rechargeable batteries as an energy source and require external charging.

[4] As discussed in chapter 2.2.1, disruptive technologies originate in either new market or low-end disruption.

[5] Downstream business are the subsequent activities of the value chain after the development and production (= upstream activity) steps, this includes e.g., marketing, sales, and services (Schmid & Grosche, 2008).

and sales are far from satisfactory" (Chen and Perez, 2018, p.54). Further, many authors agree on the imperative for BMI in the automotive industry for wider market penetration of electric cars (Bohnsack, Pinkse & Kolk, 2014; Kley, Lerch & Dallinger, 2011; Abdelkafi, Makhotin & Posselt, 2013; Krommes & Schmidt, 2017; Augenstein, 2015; Hall, Shepherd & Wadud, 2017). According to von der Ropp (2019), a growing awareness that product innovation is not sufficient to meet customer demands has raised awareness of BMI, however, product-focused companies, like those operating in the automotive industry, face difficulties in overcoming the dominant logic of their traditional business.

Various authors have contributed to the field of BMI in the automotive industry. Bohnsack, Pinkse and Kolk (2014) have focused on the impact of incumbent and entrepreneurial firms' path-dependent behavior on the development of new BMs. Kley, Lerch and Dallinger (2011) and Hall, Shepherd and Wadud (2017) defined a holistic approach to developing business models for electric mobility. Abdelkafi, Makhotin and Posselt (2013) and Laurischkat, Viertelhausen and Jandt (2016) analyzed how different BM concepts can be applied to the context of e-mobility. Krommes and Schmidt (2017) analyzed key criteria determining the prospects of electric mobility products and services. Zarazua de Rubens et al. (2020) elaborate on factors hindering mass adoption of EVs. BMI in the context of EVs is particularly interesting to investigate since large parts of the classical business model cannot be transferred to EV concepts, mainly due to technological restrictions, resulting in OEMs struggling to find a BM that creates, delivers, and captures value (Kley, Lerch & Dallinger, 2011; Augenstein, 2015; Nieuwenhuis, Cipcigan & Sonder, 2020). Therefore, the following subchapter aims to highlight the challenges companies are facing when innovating their business model to become suitable for e-mobility. This is followed by a distinction of incumbents and new entrants, as both face different challenges, but also opportunities when engaging in BMI.

2.3.1 Market Adoption Challenges of Electric Vehicles

There are multiple reasons why the diffusion of electric cars is difficult. From a consumer perspective, usually, a new technology offers a compelling advantage over the old one (Abdelkafi, Makhotin & Posselt, 2013). Due to the fact that EVs are still a developing technology, and the product competes in the same market as conventional cars, customers have certain expectations

towards EVs, regarding for instance. range and infrastructure, which cannot be fulfilled at the moment (Abdelkafi, Makhotin & Posselt, 2013; Williander & Stålstad, 2013). Funk and Strigel (2020) call this the *sandwich-dilemma*. Ultimately, OEMs are faced with the strategic issue of how to create value for customers from an inferior product while capturing value in terms of revenue (Abdelkafi, Makhotin & Posselt, 2013; Zarazua de Rubens et al., 2020; Funk & Strigel, 2020).

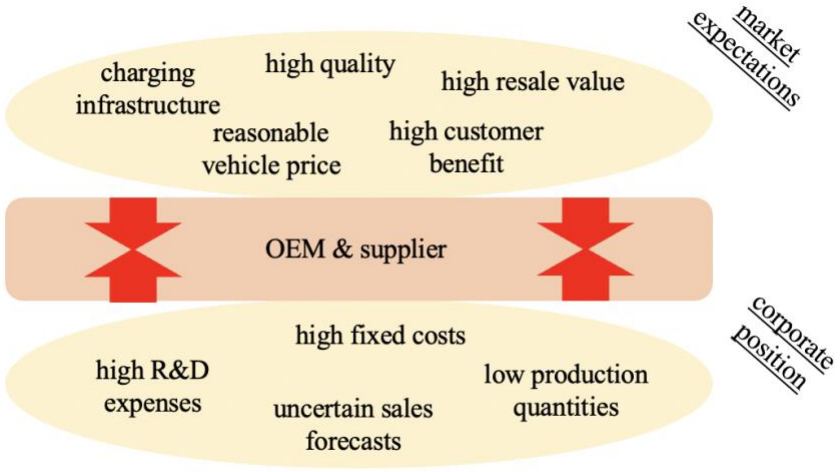

Figure 3: *The sandwich-dilemma of OEM and supplier (Funk & Strigel, 2020, p.145)*

The push for electrifying the industry mainly stems from political drivers motivated by environmental concerns. Governments, pressured by political targets set by the EU, are promoting the wider adoption of EVs through primarily monetary subsidies (Rietmann & Lieven, 2019; Augenstein, 2015). Norway has achieved the market-leading position in EV adoption through monetary subsidies and other 'soft incentives', e.g., free parking or free BEV access to bus lanes (Haugneland, Bu & Hauge, 2016). In comparison, Germany has merely introduced a purchase subsidy, which is reflected in a rather low market share of EVs (Rietmann & Lieven, 2019; Broadbent, Drozdzewski & Metternicht, 2017). This emphasizes that governmental subsidies have a significant influence on EV adoption. As pointed out by Broadbent, Drozdzewski and Metternicht (2017), governments need to implement multiple measures to address individuals' intents to successfully promote a higher adoption. Besides the government's influence, several other obstacles need to be overcome to accelerate this adoption (Zarazua de Rubens et al., 2020; Kley, Lerch & Dallinger, 2011).

Technical Restrictions

Mainly due to the battery, the vehicle structure of an ICE and an EV are fundamentally different. The current manufacturing system with the existing engine plants, welding lines, and press shop, representing the largest capital investments, could become obsolete if the production changes completely to EVs (Nieuwenhuis, Cipcigan & Sonder, 2020; Tongur & Engwall, 2014; Wells, 2013). Additionally, EVs require certain rare raw materials, leading up to new supply chains that create novel challenges (Nieuwenhuis, Cipcigan & Sonder, 2020; Donada, 2013). Further obstacles include the range limitation, battery life, charging speed, and sustainability concerns of certain key resources (Donada, 2013). To sum up, the key technology, batteries, are still developing, resulting in high costs and limited EV performance (Altenburg, Schamp & Chaudhary, 2016). To tackle this concern, plug-in hybrid electric vehicles[6] (PHEVs) represent a medium-term solution.

Charging Infrastructure and Energy Grid

Energy distribution networks are facing significant challenges to accommodate the increasing number of EVs, as they were not designed to cope with the additional electricity demand (Nieuwenhuis, Cipcigan & Sonder, 2020; Donada, 2013). Thus, smart grid solutions need to be developed alongside new cost models, which can mitigate peak energy times by enabling users to receive payments for offering flexibility to energy networks through services such as Vehicle-to-Grid[7] (V2G) or aggregators (Nieuwenhuis, Cipcigan & Sonder, 2020; Altenburg, Schamp & Chaudhary, 2016; Laurischkat, Viertelhausen & Jandt, 2016). Besides, the question of who the main responsible party is to build the infrastructure for EVs remains unanswered. Today, energy companies as well as local authorities, oil companies, and OEMs are building charging stations (Zarazua de Rubens et al., 2020), leading to an unmanageable variety of different charging prices and cards, thus creating another barrier for customers. Donada (2013) concludes that "[the] density of the recharging network, absence of common standards and strains on the electric grid are slowing the transition to the mass market" (p.168). As the utility industry is still developing in

[6] Plug-in hybrid electric vehicles (PHEVs) encompass both an electric motor and an internal combustion engine. Therefore, the vehicle can run on electricity derived from the grid or onboard generation for short trips or on gasoline/diesel for longer trips (Volkswagen Newsroom, n.d.).

[7] Vehicle-to-Grid (V2G) is an energy storage system that enables the delivery of power, e.g., electricity from the vehicle to the grid which provides the opportunity to balance the energy system during peak times (Lund & Kempton, 2008).

parallel to electric vehicles, it “leaves behind several other uncertainties [for the power system] to be solved and overcome in the upcoming years” (Nieuwenhuis, Cipcigan & Sonder, 2020, p.13).

Business Structure

According to Zarazua de Rubens et al. (2020), there is currently not a profitable business case for EVs leading to a ‘fossil fuel favoritism’. According to the authors, this is not only problematic for OEMs but also dealerships earn less margins from selling EVs, leading to a sale reluctance. Aggravating the situation is the lack of after-sales revenue, as EVs consist of significantly less components (Zarazua de Rubens et al., 2020; Wells, 2013). However, under the traditional automotive structure, most of the revenue stems from after-sales services and parts, but EVs have 80–90% less maintenance expenses, which negatively impact their profit and customer retention (Zarazua de Rubens et al., 2020). The lack of an after-sales market is therefore considered one of the most pressing issues for EV adoption under the current business structure (Zarazua de Rubens et al., 2020). Especially for the German market, most notably known for premium vehicles in the ICE segment, the transition to BEVs could lead to a potential restructuring of long-held power positions in the automotive industry (Gnann & Plötz, 2011; Hüttl, Pischetsrieder & Spath, 2010; Kampker, Vallee & Schnettler, 2013).

In summary, the key consumer pain points have been defined as: the long charging time, the short driving range (Williander & Stålstad, 2013), the lack of a comprehensive infrastructure, and the high initial investment costs (Kley, Lerch & Dallinger, 2011; Williander & Stålstad, 2013). Moreover, uncertainties regarding the second-hand market and the cost of charging devices exist (Donada, 2013). Companies need to find innovative ways to target these concerns and deliver additional value while restructuring the current revenue/cost model. Funk & Strigel (2020) highlight the success factor of marketing, where an ‘emotional charging’ of EVs needs to be achieved to increase sales volume, which emphasizes to better promote the benefits of EVs. Adding to the challenges mentioned above, firms face additional obstacles on an organizational level when striving for BMI, which are elaborated in the subsequent section.

2.3.2 Differences between Incumbents and New Entrants

First, differences between incumbents and new entrants can primarily be noted regarding their BMs resulting in different challenges and opportunities. German automotive companies, such as Audi or BMW, have developed expertise in manufacturing premium vehicles over decades, leading to a legacy of heavy assets and a proven business structure. In this sense, these firms might be reluctant to change their BM, leading to organizational inertia (Bohnsack, Pinkse & Kolk, 2014; Tongur & Engwall, 2014). The technology shift to EVs essentially means that major parts of the automotive architecture need to be redesigned, requiring capabilities that threaten incumbents' core competencies (Altenburg, Schamp & Chaudhary, 2016). The acknowledgment that the competencies are at risk as combinations of new services and products emerge has yet to be grasped widely (Tongur & Engwall, 2014). Incumbents that benefited from technological innovations to gain competitive advantage - such as Audi, who even incorporated the slogan 'Vorsprung durch Technik'[8] in their mission - are faced with the strategic dilemma to either meet customer demands through innovative, new technologies or, alternatively, embed the technology in a value proposition of a product-service system (Tongur & Engwall, 2014). As explained by the authors, this would shift the attention from the product itself to the function it provides for the customer.

New entrants, on the other hand, do not come with path dependency and therefore take novelty as main driver of their value creation (Amit & Zott, 2001), often exploring new sales channels, engaging in non-traditional partnerships, and creating new service offerings (Bohnsack, Pinkse & Kolk, 2014). Furthermore, new entrants, in comparison to incumbents such as BMW or Audi, cannot rely on existing networks and stable income sources (Bohnsack, Pinkse & Kolk, 2014). Hence, they must explore alternative marketing channels and revenue sources (Zarazua de Rubens et al., 2019; Kley, Lerch & Dallinger, 2011; Bohnsack, Pinkse & Kolk, 2014). Tesla Motors, as an entrepreneurial firm, managed to position itself as the leading EV company, especially in terms of brand reputation through innovative solutions (Chen & Perez, 2018). The company put a focus on reducing range anxiety by a high-performance supercharger network while simultaneously integrating the battery and recharging network vertically in the organization (Chen & Perez, 2018).

[8] Audi slogan, translated from German to English: 'Advancement through technology'.

Moreover, they deeply integrated IT in their BM, including in-car services such as over-the-air (OTA) updates and digital distribution channels, creating a compelling value proposition (Chen & Perez, 2018).

In many cases where technology shifts occurred before, the incumbent companies went out of business, such as in the case of Kodak regarding digital cameras (Anthony, 2016), because they did not take measures to innovate their business model to adapt it to the changing competitive landscape (Tongur & Engwall, 2014). Initial studies further show that the perception of a competent incumbent in ICE vehicles does not directly transfer to EVs (Funk & Strigel, 2020). The pressure is growing to develop a suitable business model, as first movers are entering the market and are ready to disturb the traditional business structure (Kley, Lerch & Dallinger, 2011). The industry's emerging BMIs, aiming to increase the wider adoption of EVs, are highlighted in the following section.

2.3.3 Emerging Business Model Patterns

Many aspects of the emerging business models for EVs result from limitations regarding the battery, as most OEMs do not control the technological progress, hence new services are created to mitigate shortcomings (Bohnsack, Pinkse & Kolk, 2014). In the ICE market, "the vehicle manufacturers had little concern for the fate of their products once they had been sold" (Wells, 2013, p.231). However, this 'sell-and-disengage' approach is not suitable for EVs, as many uncertainties and doubts regarding the technology exist (Williander & Stålstad, 2013). Moreover, while economy segment vehicles focus on incremental changes such as cost reduction and battery leasing, premium vehicle manufacturers are venturing into a more transformative mobility sector (Bohnsack, Pinkse & Kolk, 2014). Overall, business models for EVs are 'fluid' as the industry is still emerging (Bohnsack, Pinkse & Kolk, 2014). In the case of a technology like EV, which is still immature and where standards have not yet been established, BMI proves to be even more important (Abdelkafi, Makhotin & Posselt, 2013).

According to Kley, Lerch and Dallinger (2011), there are four drivers to reduce customer concerns while increasing acceptance of EVs, resulting in emerging business models:

Table 3: *Drivers for emerging business models (created by authors based on Kley, Lerch and Dallinger, 2011, p.3393)*

Driver	Example
(1) Better utilization of vehicle capacity	Car-sharing: expand user base at the low maintenance cost of EVs
(2) Extended utilization concept	Smart-grid: increases economic efficiency by balancing the power system
(3) Secondary usage for batteries	Power source: secondary application as energy storage
(4) Increase acceptance through additional services	Service: include ICE option for long trips

While utility companies are mainly engaging in BMI in the second and third driver, OEMs are concerned with the first and fourth drivers. Hence, pilot projects to overcome obstacles of e-mobility expanding their traditional business model have been initiated (Krommes & Schmidt, 2017; Zarazua de Rubens et al., 2019). Hall, Shepherd and Wadud (2017) identified the necessity of new ownership and service models in the context of electromobility. Williander and Stålstad (2013) define these further by proposing four potential BMIs: electric leasing, electric subscription, car-sharing (for employees), and car fringe benefits for accelerating the commercialization of electric cars. Even though these models already exist for ICEs, Williander and Stålstad (2013) argue that the lower total cost of ownership (TCO), as well as the cost advantage of EVs in terms of cheaper energy compared to gas for conventional cars are compelling advantages of electric cars. In line with Williander & Stålstad (2013), Laurischkat, Viertelhausen and Jandt (2016) view the increased utilization of EV as an important driver of a wider adoption and argue for the advantages of EVs from a reduced cost per kilometer aspect.

Moreover, OEMs are already offering additional services and products to increase the acceptance of EVs by offering battery leasing or home wallboxes, while for the latter product they often engage in cooperation with third parties as they lack competencies in producing these products (Krommes & Schmidt, 2017; Zarazua de Rubens et al., 2020). In addition, the BM of battery swapping provides an attractive proposition for customers, as it tackles the long charging time and battery concerns (Laurischkat, Viertelhausen & Jandt, 2016). However, the bankruptcy of the battery swapping venture *Better Place* shed light on the challenges of operating a complex model

in an emerging market (Donada & Lepoutre, 2015; Laurischkat, Viertelhausen & Jandt, 2016). Besides, Hall, Shepherd and Wadud (2017) define the need for a coherent and accessible public charging network to tackle concerns on energy infrastructure capabilities. Other emerging solutions include the elimination of the dealership model to become more profitable, counter sales reluctance and gain customer data (Zarazua de Rubens et al., 2020). The direct-to-customer sales approach has been discussed apart from EV but is gaining more attention due to the negative profit margin of EV sales. However, this is difficult to implement for incumbents due to existing relationships and interdependencies. Zarazua de Rubens et al. (2020) propose further solutions for premium OEMs, such as including the charging costs in the sales price of the car, like Tesla did in their early days.

Various scholars have proposed BMIs, some of which have been implemented by incumbents, e.g., ridesharing. By introducing a variety of products and BMs, EV companies are competing for the dominant design in the market (Chen, Chowdhury & Donada, 2019). In the downstream business, the "customer needs and preferences play an important role in the development of business models, because they define whether a business model fits for them and is going to be successful or not" (Laurischkat, Viertelhausen & Jandt, 2016, p.485). Only by moving the customer into focus when creating new business models new services and gaps in the market can be identified (Stryja, Schüritz, Kühl, Hottum & Satzger, 2015).

In addition, OEMs must look beyond the individual organizational level and take an overall perspective by analyzing systems as a whole (Kley, Lerch & Dallinger, 2011). As noted in the previous chapter, utility and energy companies are important drivers for the adoption of EVs, but also battery manufacturers and charging infrastructure operators become relevant (Xue et al., 2012). To develop a profitable BM, OEMs have to consider the complex interactions between new partners and stakeholders and newly define the value creation (Xue et al., 2012; Kley, Lerch & Dallinger, 2011). "BEV can only be successful when evolving in terms of a more systemic change. The technological shortcomings of the BEV as compared to conventional cars in the context of today's car-centered transport system become irrelevant or may even turn into advantages when the BEV is envisioned as part of a system innovation towards e-mobility" (Augenstein, 2015, p.3).

In this regard, partnerships can help OEMs gain competencies quickly in fields that deviate from their core business to explore new business models; in doing so they are able to gain insights into customers' mobility behavior and increase brand loyalty (Krommes & Schmidt, 2017). Various scholars have emphasized the importance of moving into an ecosystem of mobility services. Laurischkat, Viertelhausen and Jandt (2016) for example point out that "the provider of [a] full-service mobility business model benefits from collaborative work with his business partners to convince potential customers with a continuous and complete mobility solution" (p.487).

Generally, it is important to acknowledge that EVs are a part of a bigger disruptive movement in the automotive industry, alongside digitization, autonomous driving, and shared mobility, often coined as ACES. In combination, EVs can be viewed as smart devices able to connect to a product system increasing value for customers (Krommes & Schmidt, 2017; Zarazua de Rubens et al., 2019). Additionally, Krommes and Schmidt (2017) highlight that the ownership of customer data becomes more important if the BM shift in the industry changes from selling a car to an electric mobility system. If the traditional system perpetuates, EV manufacturers would ultimately be reduced to solely suppliers of EVs if they do not change their business model (Krommes & Schmidt, 2017).

2.4 Summary

The conducted review of BM literature has only begun to create a picture of the full extent of contributions to be found in this field. Nonetheless, it indicates a certain direction. The business model can generally be understood as a blueprint, highlighting *how* an organization creates and captures value. Different opinions about its exact components exist, yet a strongly held view in the literature is that the BM is a system of all the activities needed to create and capture value for a firm. These activities make up the design of the business model. Besides the obvious, creating and capturing value, the BM further functions as a kind of 'kick starter' for a company to elaborate on their competition strategy, as it stimulates to consider for example a value proposition or start defining a cost/profit structure. The review on BMI finally highlighted the importance of utilizing dynamic business models, which emphasizes to continuously develop or reinvent a BM and adapt it to occurring contingencies. What, however, hinders many organizations in this endeavor are,

according to research, organizational inertia as well as the lack of human resources taking a lead in BMI. Issues well known in the automotive industry.

In the context of the technological shift to EVs, car manufacturers are facing several challenges to promote a wider market adoption ranging from technical restrictions of the battery to the lack of charging infrastructure and the legacy of the business structure of ICEs in the market. Incumbents have to deal with path dependency and organizational inertia, while new entrants must explore options to finance their operations and scale their business. To mitigate customer pain points OEMs are piloting new mobility service offerings such as car-sharing. New alliances between car manufacturers, energy and utility companies, as well as the transport sector are inevitable for a wider adoption of EVs (Hall, Shepherd & Wadud, 2017). Alongside the other three megatrends, EVs have the potential to transform the automotive industry, therefore companies need to find ways to cater for changing consumer needs and demands in a profitable manner.

2.4.1 Preliminary Proposed Framework

The literature has highlighted several components that need to be considered in an EV BM to benefit OEMs at the present studied time as well as factors driving the establishment of the EV BM. Based on these emphasized elements, the literature review allowed to establish a theoretical framework aiming to depict the most relevant components and drivers of a potential EV business model for OEMs in a mature (automotive) market in comparison to the traditional ICE business model. It has been decided to focus on the three BM elements deemed most relevant regarding the reviewed literature: *Key Partners*, *Cost Structure* and *Key Resources*. The literature on BMI within the (German) automotive market particularly refers to the significance of partnerships in the context of EVs, as new key components to produce EVs are required. Well-established partnerships considering ICE manufacturing cannot fulfill the new needs of the EV manufacturing environment, thus new partnerships are required. Further, the literature points out that unlike for ICEs, the cost structure for EVs moves into the focus as there is no profitable business case yet. Lastly, the literature strongly relates to a change in key resources, as raw materials especially required for the battery are scarce.

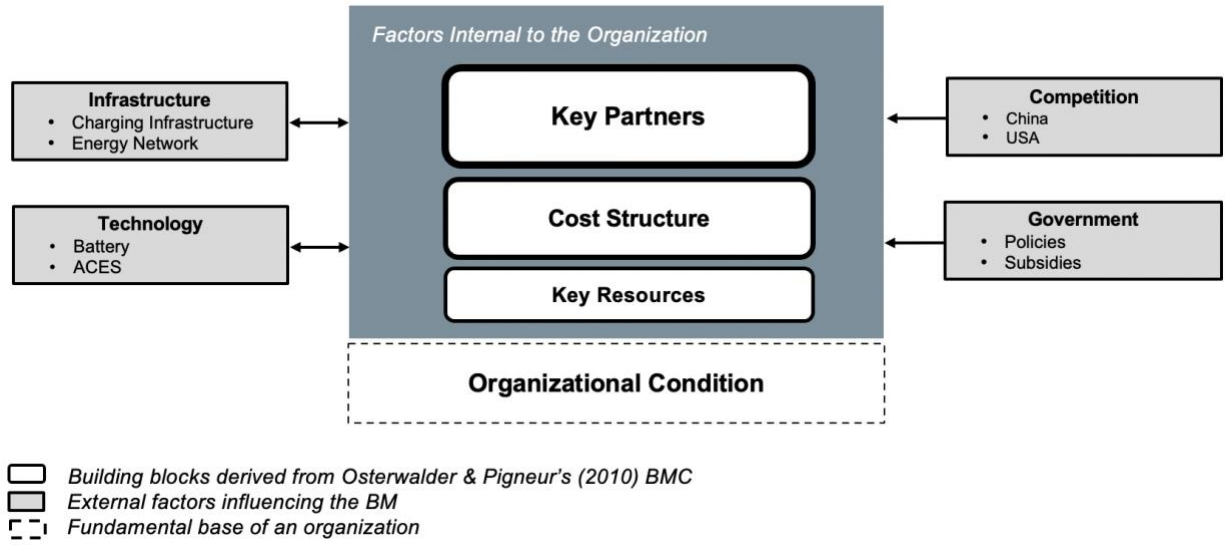

Figure 4: *Preliminary theoretical framework depicting the most significant elements to be considered for a potential EV (compared to ICE) business model from an OEM perspective (figure created by authors based on the literature review)*

The established framework consists of a total of eight components and is loosely based on the BMC introduced by Osterwalder and Pigneur (2010). As previously discussed, the BMC provides a comprehensive overview of the elements a BM should address and thereby covers several perspectives from the literature. Leveraging the BMC allows a more granular exploration on the importance of single BM components compared to Bohnsack, Pinkse and Kolk's (2014) framework, which focuses merely on three abstract elements. Furthermore, the BMC enables collecting a lot of data on BM design and BMI when utilized as an underlying base to an interview questionnaire[9]. The three components adopted from the BMC are grouped together and designated as internal factors. Their different sizes signal their different weightings regarding the importance for an EV BM in contrast to one suitable for ICE technology.

Resulting from the synthesis of the literature review, the framework draws from further contributions. Whereas the BMC solely regards internal components of a BM, the review of BMI literature in the context of EVs yielded four external driving factors to be considered: *competition*,

[9] One part of the conducted expert interviews was to ask respondents to rank the components of the BMC according to their relevance to EV technology and to justify their choices accordingly. The questionnaire can be found in Appendices A and B.

the *government*, *infrastructure*, and *technology*. Competition describes taking the threats and opportunities as presented by competitors and new entrants into consideration. The second factor, government, accounts for various governmental regulations and subsidies regarding EVs. Infrastructure primarily describes the required charging infrastructure. This includes the energy network providing the base for the infrastructure. Lastly, technology for one refers to the battery technology underlying EV technology and, for another, serves as an umbrella term for the three remaining concepts that make up the ACES megatrends. The arrows between the mentioned factors outline their influence on the EV business model. The double-headed arrows linking infrastructure and technology with the internal components signal that there exist interactions between them. For example, the charging infrastructure is significantly influenced by how large and sound the EV offer resulting from a business model is, yet at the same time, a potential business model must be coordinated with the existing infrastructure to be effective. Finally, *organizational condition* represents a significant element to be considered for a potential EV business model, as it depicts the status quo of an organization (i.e., current performance in terms of quality and pace, available resources, image, brand associations, organizational legacy). The theoretical framework's (Figure 4) validity will be tested in this study for each one of the three considered cases and either be confirmed, contradicted, or amplified.

3 Research Methodology

In this section, the method underlying this study with the intent to address the proposed research question and purpose is elaborated. Furthermore, we briefly address the study's research philosophy (epistemology) to form the philosophical foundation of the project (Hesse-Biber, 2016). Subsequently, research design and method as well as the research process are introduced. In a final step, the method of data analysis is elucidated and critically reflected by assessing the study's validity, reliability, and ethical considerations.

3.1 Epistemological Stance

Prior to starting the research, the relationship between the researchers and research participants should be clarified and their roles delineated. This can be done by agreeing on a *worldview*, or *epistemology*, and helps to explain why researchers chose an either qualitative, quantitative, or mixed methods approach for their research (Creswell & Creswell, 2018). Even though qualitative research is characterized by expressing multiple epistemological stances, Hesse-Biber (2016) argues that the perspectives can be narrowed down to three umbrella categories: positivist, interpretive, and critical. Partially in line with this, Yin (2014) argues for two epistemological orientations: relativist/interpretivist and realist. His definition of the realist perspective, which he claims to be mostly present in case study research, is to assume that there is a single reality independent of any observers. However, he concedes that a case study approach can in fact acknowledge multiple realities and, in this context, findings depending on observers; this describes the relativist/interpretivist orientation. Similar to the interpretive/interpretivist perspective discussed by Hesse-Biber (2016) and Yin (2014), Creswell & Creswell (2018) term a perspective stating that individuals seek to understand the world and ascribe subjective meanings to their experiences as constructivism. They further explain that researchers following this worldview "look for the complexity of views rather than narrowing meanings into a few categories or ideas. The goal of the research is to rely as much as possible on the participants' views of the situation being studied" (p.46).

Underlying the present study is an interpretive (Hesse-Biber, 2016), respectively interpretivist (Yin, 2014; Bell, Bryman & Harley, 2019) or constructivist (Creswell & Creswell, 2018), perspective. In the knowledge-building process, this perspective equally views researchers and participants as co-creators, whereby the perspectives of the participants are particularly highlighted (Hesse-Biber, 2016). Since our study focuses on exploring research participants' different perceptions, we anticipate obtaining multiple realities.

3.2 Research Design and Method

As the aim of this study is to explore and enhance the understanding of the meaning individuals ascribe to a social subject, a qualitative research design has been applied (Creswell & Creswell, 2018). This form of inquiry focuses on "individual meaning, and the importance of reporting the complexity of a situation" (Creswell & Creswell, 2018, p.41). "The key concern is understanding the phenomenon of interest from the participants' perspectives" (Merriam & Tisdell, 2020, p.16). For this purpose, a multiple-case study of different perceptions of business model innovation in the context of electromobility has been conducted. Each category (German OEMs, Chinese EV companies, industry experts) represents one case, as they are distinct participants of the industry's transformation encompassing different positions and perspectives. In this respect, "each case serves as a distinct experiment that stands on its own as an analytic unit" (Eisenhardt & Graebner, 2007, p.25). Further, each group is bounded in a system where the characteristics of one case can be distinguished from the others (Merriam & Tisdell, 2016; Yin, 2014). According to Merriam & Tisdell (2016), multiple-case studies are "undertaken for the purpose of comparing the cases [which] allow the researchers to compare and contrast the findings deriving from each of the cases [and] consider what is unique and [...] common" (p.67). A holistic multiple-case study approach is therefore appropriate, as the purpose of this thesis is to understand the differences and similarities between the cases. According to Yin (2014), the case study is the preferred research method when exploring contemporary events in depth within its real-world context where the researcher has little or no control over the events. There are three types of case studies: explanatory/causal, descriptive, and exploratory studies (Yin, 2014). The latter one is often used to answer *how* and *why* questions (Yin, 2014). Compared to a single case study, multiple-case studies are deemed to be more compelling and robust (Herriott & Firestone, 1983). In addition, the

inclusion of multiple cases further enhances the external validity or generalizability of the findings compared to a single case study (Merriam & Tisdell, 2016). Even though it has not always been recognized as a proper scientific approach, the case study method has evolved into a common technique utilized in different scientific disciplines (Dubois & Gadde, 2002) and remains a very challenging endeavor in social sciences (Yin, 2014). This is for example due to the fact that the management of case study data is more difficult; "the researcher probably has considerably more raw information and must find ways to handle it without becoming overwhelmed" (Merriam & Tisdell, 2016, p.234).

The qualitative design of the study is characterized by multiple aspects. For one thing, as stated by Creswell and Creswell (2018), "the research process for qualitative researchers is emergent" (p.257). Adjustments in the interview guideline and questionnaire emphasize this characteristic in the present study. During the research process, insights from previous interviews were applied to revise and refine the guideline for upcoming interviews, if necessary. Furthermore, the main qualitative method we used were expert interviews. Here, we utilized mostly open-ended questions to allow interviewees to broadly elaborate on subjects. Interviewing depicts a basic mode of inquiry and allows for making sense of people's experiences (Seidman, 2006). As it is common for qualitative research design to gather data from multiple sources (Creswell & Creswell, 2018), we also focused on secondary data, collected through public documents, besides our primary interview data.

The above-described qualitative research design follows both an inductive and a deductive approach. As it is common for qualitative studies, we worked primarily inductively, "building patterns, categories, and themes from the bottom up by organizing the data into increasingly more abstract units of information" (Creswell & Creswell, 2018, p.257) and working with iterations during the data analysis process. An inductive way of working could further be expressed in the fact that we placed our focus on individuals' meaning (Creswell & Creswell, 2018) through the conducted interviews. Moreover, we gathered secondary data, mainly in the form of company reports and publicly available company insights, to provide additional evidence supporting the themes elaborated from the primary data. By including parts of Osterwalder and Pigneur's BMC in our theoretical framework, we further tested an existing theory (Creswell & Creswell, 2018),

applying a deductive approach. A detailed overview of the research process is displayed in the following, including an overview of preparatory processes, the selection of participants and the applied data collection method.

3.3 Research Process

This subchapter aims at highlighting the single steps constituting the research process. Typically, the process of qualitative research initially involves establishing questions and procedures (Creswell & Creswell, 2018). In this regard, we started the process with preparatory steps prior to discussing the selection of participants and the data collection process.

3.3.1 Preparatory Process

A comprehensive literature review, focusing primarily on contributions from the strategic management domain, depicted the starting point of this study. To provide a structured overview of the research's area of inquiry, reviewing the literature followed a funnel approach. This means that categories of works relevant to the study, however not directly discussing the specific research topic, have been addressed in advance to categories thematically closer to the thesis' inquiry (Hofstee, 2006). Thus, prior to reviewing the most familiar and recent business models deployed in the automotive industry, we addressed the roots of business model theory and business model innovation. Building on this literature review, we established a preliminary theoretical framework, whose validity was to be tested through the empirical data. According to Merriam and Tisdell (2016), the framework of this study, drawing from the terms, definitions, and theories found in the literature, shapes the thesis' research question and further the data collection and analysis techniques.

The literature review set the foundation for establishing a questionnaire to be used in the interviews. As proposed by Hesse-Biber (2016), researchers using a qualitative approach can prepare for the interview process by creating a guide, which is especially helpful for novice interviewers. Thus, we first set up an overview of key topics to be explored through the study. In a next step, these topics were formulated into different domains of inquiry. In addition to the

literature review, this step helped to narrow down the area of interest. The established guide later served as a structure for our questionnaire. Prior to collecting the primary data through the interviews, an explorative interview served to modify the preliminary questionnaire and finalize it. The questionnaire was created to suit semi-structured interviews. This allowed the conversations to remain loosely based on the questions asked and the participants to have "some latitude and freedom to talk about what is of interest or importance to them" (Hesse-Biber, 2016). This aspect was crucial, as our study primarily focuses on participants' perceptions.

Since this study looks at the perspectives of respondents, each of which can be assigned to one of three different categories, we elicited two slightly different questionnaires, both of which can be found in the appendices (Appendix A and Appendix B). Questionnaire A was used for interviews with participants belonging to categories one (German OEM employees) and two (industry experts), whereas questionnaire B was used for interviewees in category three. The difference between the two questionnaires is that questionnaire B specifically refers to the role of Chinese EV companies. Depending on the interviewee category and respective questionnaire, we created three to four domains of inquiry to ensure a reasonable flow of the questions (Bell, Bryman & Harley, 2019).

Table 4: *List of respondent categories (created by authors)*

Category	Description	Questionnaire	Number of Respondents
I	German premium OEM employees	A	4
II	German industry experts (e.g., automotive consultants)	A	4
III	Chinese EV company employees	B	3

3.3.2 Selection of Interviewees

A *purposeful sampling* approach, as labeled by Merriam and Tisdell (2016), which is based on the idea that researchers want to "discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (p.96) was followed for the participant selection

process. The pool of interviewees for each expert category was carefully selected based on the participants' understanding of business models present in the automotive market as well as their general electromobility and automotive expertise to ensure meaningful contributions. We further leveraged a *snowball sampling strategy*, where after identifying a few key participants who meet the criteria in one category we asked them for reference to further potential participants (Merriam & Tisdell, 2016). This was especially the case for the Chinese EV companies, as in Chinese culture there is a deeply ingrained skepticism about participating in foreign studies of unknown researchers. Therefore, a reference provided more legitimacy which was crucial to increase the willingness in the participation of the research. The remaining participants have been contacted through either LinkedIn or personal professional networks.

The literature revealed significant differences between incumbents and new entrants. Therefore, participants from category one are employees of established car manufacturers that dominate the premium segment in the respective market. Interviewees in category three, on the other hand, were selected among Chinese EV companies planning to enter the European or specifically the German market in the near future. This category represents the new market entrants which, against the background of a changing competitive landscape regarding EVs, represent an interesting and insightful perspective. To add a more neutral industry perspective the second category, automotive industry experts, had been identified, as they are not employed by any OEM, directly reducing their bias against a specific firm. Besides, particularly the participating automotive consultants have gained expertise through multiple projects at various car manufacturers allowing them to have a more general market perspective. Furthermore, all interviewees were chosen based on their level of work experience, reflected in their job position.

3.3.3 Data Collection Method

Primary data was collected through eleven single-person semi-structured interviews. The benefits of using interviews as a data collection lie in gaining insightful views and subjective perceptions of the respondents, as well as in the targeted focus on the research problem (Yin, 2014; Bell, Bryman & Harley, 2019; Merriam & Tisdell, 2016). The study relied on the researchers as the instrument of data collection, as elaborated by Creswell and Creswell (2018). The individual

questions were similar for each interviewee (based on questionnaires A or B, respectively). However, the semi-structured approach allowed us to not follow the questionnaire rigorously and ask spontaneous questions to pick up on things the interviewees said, which provided an in-depth understanding of important aspects mentioned (Bell, Bryman & Harley, 2019).

Due to the geographical dislocation to the interviewees as well as the ongoing COVID-19 pandemic the interviews have been conducted solely online. They were held in real-time through tools such as Google Meet and WeChat, containing a video component that enabled face-to-face interviews. While this approach entails many advantages, such as being able to reach interviewees around the globe, one disadvantage of this method is the technological risk of an unstable internet connection, which could negatively impact the flow of the interview and create frustration (Merriam & Tisdell, 2016). However, we did not encounter such issues. For the participants located in China special considerations regarding time differences and common practices of interview conduct in this country have been applied. Therefore, WeChat has been used as the medium of communication. The interviews lasted between 45 to 60 minutes and were conducted in the participants' preferred language - either in Chinese, English, or German - to allow the participants to express their views in more depth. All interviewees were provided with a copy of the questionnaire prior to the interview which, according to Bell, Bryman and Harley (2019), can strengthen the dependability of the research. Before conducting each interview, we asked for consent to audio record, transcribe and further analyze the interview. Both of us have been present in the interviews and took slightly different roles in the process. While both asked questions, one person was fully focused on conducting the interviews, the other took short notes that were discussed briefly after every interview. To create a common understanding, the study participants were provided with an overview of the BMC by Osterwalder and Pigneur (2010) together with the respective definitions of the nine building blocks during the interview process[10].

[10] The BMC depicts a significant framework underlying this study, respectively the questionnaire. Thus, study participants were provided a comprehensive overview.

Table 5: *List of respondents (created by authors)*

Respondent	Position	Company	Category	Link to study
A	**Senior Manager Purchasing**	*Anonymized* - German premium OEM	I	Participant has over 20 years of experience in the automotive industry and knowledge about supply chain management of electronics and digital partner management.
B	**Sales Strategist**	*Audi AG* - German Premium OEM	I	Participant has over seven years of sales strategy experience, of which some time was spent developing strategies for the Chinese market. The respondent thus disposes of both the German and Chinese view. The interviewee further has expertise in the areas of e-mobility and operating systems of the future.
C	**Project Leader Technical Development**	*Anonymized* - German premium OEM	I	Participant has experience in R&D in the field of software development. Respondent further has expertise as a process consultant within the technical development division of a German premium OEM.
D	**Project Manager Sales & Marketing**	*BMW AG* - German premium OEM	I	Participant has experience in sales management and organizational activities of a German premium OEM. As a specialist for sales management, the respondent is responsible for consulting for sales strategies, streamlining internal processes, and controlling sales KPIs.
E	**Senior Consultant Automotive**	*Anonymized* - Strategy Consultancy	II	Participant has a broad knowledge of German OEMs, their operation processes, current hardships and opportunities, as well as experience from multiple automotive consulting projects.
F	**Senior Manager Automotive**	*BearingPoint GmbH* - Management & Technology Consultancy	II	Participant has long-term experience with German OEMs, their operation processes and current hardships and opportunities. Besides automotive consulting expertise, the respondent has years of experience of supply chain management and logistics through working for an automotive supplier.
G	**Automotive Consultant Customer Experience Strategy**	*Anonymized* - Management & IT Consultancy	II	Participant has experience in IT and marketing strategies for EVs in the context of customer experience.
H	**PhD candidate; Market Intelligence Analyst**	*Anonymized* - German Automotive Supplier	II	Participant is a PhD candidate for consumer behavior regarding EVs at the University of Würzburg, Germany. Further, the respondent works for an international automotive supplier in Germany.

I	**Sales Consultant EVs**	*BYD* - Chinese EV Company	III	Participant has experience in customer acquisition and management, sales promotions, and after-sales management. BYD is one of the best-selling EV car manufacturers worldwide (China Daily, 2020).
J	**Sales Manager New Energy Vehicles**	*WM Motor* - Chinese EV Company	III	Participant has expertise on new energy and electric vehicles in a sales environment in one of China's rising EV startups. Respondent further has experience in customer development and management, sales promotions, and data analysis.
K	**Project Manager Innovation Research**	*Anonymized - Chinese EV Company*	III	Participant has six years of automotive industry experience in the areas of project management for brand-related topics, strategy, and market research projects.

Additional to primary data collected through the expert interviews, secondary data, in the form of company reports and websites, news articles, and official statistics, was gathered. The data analysis process is further elaborated in the subsequent section.

3.4 Data Analysis

According to Merriam & Tisdell (2016), "data analysis is a complex procedure that involves moving back and forth between concrete bits of data and abstract concepts, between inductive and deductive reasoning, between description and interpretation" (p.202), whereby the general intent of qualitative data analysis is "to make sense out of text and image data" (Creswell & Creswell, 2018, p.267). In our research, we followed the approach described by Creswell and Creswell (2018), including five steps:

1. Organizing and preparing the data
2. Reading through the data to create a first general sense of the information
3. Coding the data
4. Generating descriptions and themes
5. Presenting descriptions and themes (in text and visually)

To assist this iterative process and help analyzing the great amount of data collected through the interviews, software[11] was used. In a first step and following each interview, notes that were taken were discussed to create a first common understanding and clarify possible misapprehensions. Once an interview was conducted, it was transcribed. This was done directly in the software. For some interviews, a selective transcription procedure was used, i.e., only utterances that were considered important for the research were transcribed (Hussy, Schreier & Echterhoff, 2010). To prevent large amounts of text generated through the interviews, which can lead to a mere reproduction of what has been said in the results, data must be reduced to the area of inquiry (Seidman, 2006). This was done by coding the data, which depicts "assigning some sort of shorthand designation to various aspects of your data so that you can easily retrieve specific pieces of the data. The designations can be single words, letters, numbers, phrases, colors, or combinations of these" (Merriam & Tisdell, 2016, p.199). The utilized software provided a helpful user interface that offered the possibility to store codes with different colors and organize them in different folders. Coding the data allowed arranging them to be able to recognize patterns in the participants' statements. These patterns were used to create broader themes, which were then repeatedly reviewed and modified during the remaining process of data analysis. From the established codes and themes, descriptions and a thematic analysis were conducted. Both expected as well as surprising codes were found during the analysis (Creswell & Creswell, 2018). Applied codes in the data were primarily categorial and analytical, which allowed to "capture a broader range of meaning" of the primary data (Hesse-Bieber, 2016, p.874).

Once these descriptions were established, the cases could be interpreted. Common for multiple-case study methods, two stages of analysis need to be addressed. First, the within-case analysis, which treats each case as a single comprehensive case, and second, the cross-case analysis, seeking to establish abstractions across all the cases (Merriam & Tisdell, 2016). In this regard, the different perspectives of the interviewees have been compared to gain a feeling of the distinctiveness of the views (Yin, 2014) and an analysis across cases, i.e., comparing the different categories of participants, was conducted. This process step helped interpreting the single cases. Naturally, analyzing interview transcripts with an entirely open attitude is impossible for researchers (Rowan,

[11] We used MAXQDA Standard to transcribe, code and analyze the collected data.

1981) and anchoring or confirmation biases must be addressed as limitations to this study. Further, it is not possible to fully understand interviewees' statements or experiences, yet "we can strive to comprehend them by understanding their actions" (Seidman, 2006, p.9).

3.4.1 Validity and Reliability

"The interviewer-respondent interaction is a complex phenomenon as both parties bring biases, predispositions, attitudes, and physical characteristics that affect the interaction and the data elicited" (Merriam & Tisdell, 2016, p.130). In this regard, several threats to both internal and external validity need to be noticed. Firstly, internal validity is threatened by the selection criteria of the participants, as these might predispose respondents to have particular outcomes (Creswell & Creswell, 2018). As study participants were chosen based on their professional backgrounds (car manufacturer employees, automotive consultants), their answers can be expected to be biased to some extent, for example towards their employer. Moreover, German OEM employees might have a stronger affinity towards the German market, which might also be reflected in their perceptions regarding the future of the German automotive industry, whereas Chinese EV manufacturer employees might have less affinity or a different kind of affinity (e.g., more from a competitor's perspective). This, of course, was taken into consideration when analyzing and discussing the empirical results. Secondly, an external threat could be the limited number and diversity of respondents, as it could constrain the validity of results. Further, it would make it more difficult to create a generalizable statement (Creswell & Creswell, 2018). However, the multiple-case study approach chosen for this study can be seen as a strategy to enhance the external validity and generalizability of the findings (Merriam & Tisdell, 2016). Particularly, an analytic generalizability logic is taken to generalize findings of the study, strengthening the applicability to other situations beyond the studied case (Yin, 2014). Based on the market conditions and competition environment of the country the findings can be extended to other countries sharing the same attributes as the studied case. Yin (2014) further describes tactics to increase validity. One is to use multiple sources of proof. To ensure validity, we thus relied on primary (interviews) as well as secondary (public documents) data. Another tactic, Yin (2014) explains, is to have the interviewees review the report. Based on this, the transcripts were double-checked with all study

participants. This triangulation approach further helped to build a coherent theme across all study participants (Creswell & Creswell, 2018).

Qualitative reliability generally refers to research that can be labeled consistent or stable (Creswell & Creswell, 2018). Following Yin's (2014) suggestion to document every step of the research process to allow others to imitate the process at a later stage if required, we included a record of each research step in the methodology chapter. Moreover, to ensure consistency in our data analysis, we regularly reviewed each other's work, particularly the transcripts and coding approach. As we used software to help with the creation and analysis of codes, we further enhanced consistency (Creswell & Creswell, 2018) and thus the reliability of the study.

3.4.2 Ethical Consideration

According to Hesse-Biber (2016), the "moral integrity of the researcher is a critically important aspect of ensuring that the research process and a researcher's findings are trustworthy and valid" (p.191). While conducting our research, we thus took ethical considerations into account as we aimed to prevent causing any harm to participants. Bell, Bryman and Harley (2019) address four ethical principles that researchers should follow: "avoidance of harm, informed consent, protection of privacy through confidentiality, and the prevention of deception" (p.109). Therefore, prior to starting an interview, informed consent was reviewed together with the interviewee to "safeguard participants from any mental or physical harm that might befall them as a result of their participation" (Hesse-Biber, 2016, p.210). Each participant was informed about the nature of the study, their role, and the intended use for their contribution. Additionally, they were informed about their rights to withdraw content at any time or have it anonymized. At the request of all interviewees, we anonymized their identities and/or the names of their employers. Participants were given the choice to stop the interview process at any time as well as to refuse answering specific questions. According to Bell, Bryman and Harley (2019), "the issues of confidentiality and anonymity raise particular difficulties for many forms of qualitative research, where great care has to be taken with regard to the possible identification of persons and organizations" (p.116). Therefore, participants were asked whether they would like their personal information to be

anonymized once again following the interview. Moreover, they were given the opportunity to review and change their provided answers. This way full transparency was ensured.

4 Empirical Results

This chapter describes the results obtained from the study. Following a brief description of the studied cases by presenting findings from secondary data, the subchapters are dedicated to the findings from the conducted interviews, the primary data.

During the interviews, it became apparent that the respondents had difficulties rating all nine internal factors (BMC building blocks) in terms of their relevance for an EV BM. According to the respondents, this was mainly because they considered the elements to be interrelated and, in this sense, all important. They were, however, confident to identify the three most significant ones as well as the least relevant element. Moreover, as each interview progressed, it became evident which factors the respective participant considered most important (e.g., through the provided responses or the number of occurrences of a code referring to a specific element). For the given reasons, we only focus on the three most significant business model components identified based on Osterwalder's BMC. Logically, it is deemed appropriate to also focus the discussion (chapter five) on the three most important factors. This allows a more comprehensive analysis of the categories' perspectives, given the scope of this thesis.

4.1 Description of Cases

The following descriptions serve to create a first understanding of each of the three categories and their respective perspective on the shift in technology and the associated BM regarding e-mobility by presenting findings from secondary data[12]. This lays the groundwork for the primary data (interview data), displayed for each category following section 4.1.

German Premium OEMs

Germany and its automotive industry strive to become a pioneer in the field of electromobility, both as a lead provider and as a lead market (VDA, 2021). Yet, the U.S. competitor Tesla is leading

[12] The secondary data depict company reports, consultancy reports, newspaper articles and the like.

the race in the global EV market, pressuring German OEMs to catch up (Fasse, 2021). By working on soon releasing a 'flood' of new EV models, Germany's largest OEMs, Audi, Mercedes, BMW and Volkswagen (VW), are determined to race to the top (Fasse, 2021). What further pressures German OEMs are the strict targets and goals of the European Union derived from the Paris Climate Agreement, which demands complete CO-neutral transportation until 2050 (Volkswagen AG, 2021). Furthermore, candidate for Chancellor of the Green Party in Germany, Annalena Baerbock, recently stated that her party is aiming towards 40 times more EVs on German streets by 2030 (ZDF, 2021). At the moment, one of the key incentives to foster adoption in the German automotive market provided to both OEMs and end-users are monetary subsidies in the form of an *environmental premium* of between 5.625 to 9000 euros (Bundesregierung, n.d.). This proved effective by tripling numbers of new EV registration in North Rhine-Westphalia[13] in 2020 (Hild, 2021). Moreover, the German government further added an *innovation premium* in 2020, which entails monetary incentives to foster the establishment of an electric mobility infrastructure and a tax exemption for people buying or leasing an EV for ten years following the purchase (Bundesregierung, n.d.).

Prodded by competition, not only from the U.S. but also from China with their recent increase in promising EV startups (Singh, 2021) and by governmental regulations, German OEMs are in the midst of investing heavily in e-mobility. The Volkswagen Group is investing around 30 billion euros in electromobility, aiming to make EVs one of their central future success factors (Volkswagen AG, 2021). The BMW Group plans to invest 400 million euros into transforming a new vehicle assembly plant, where ICEs are currently still being manufactured until 2026 (BMW Group, 2021). The company further aims to invest 279 million euros in the retraining of employees (BMW Group, 2021). Audi strengthens their budget for EV development until 2025 and allocates 17 billion euros to e-mobility, hybridization, and digitization. In this regard, one of their critical challenges revealed is converting plants producing ICEs to EV production (Audi, 2021). This goes hand in hand with the strategic transformation of current ICE BMs to EV suiting BMs.

[13] Germany's most populous federal state.

German Industry Experts

The consensus among industry experts, specifically among consultancies, regarding the automotive industry is that there is a shift towards electric vehicles, which occurs even faster than expected (Arora, 2021; Küpper et al., 2020; Mosquet et al., 2020). Developing new and innovating the existing BM suitable for ICEs to adjust it to the new technology depicts industry experts' key suggestion for industry players, such as OEMs (Capgemini Invent, 2018; Amsterdam Roundtable Foundation & McKinsey, 2014; Stricker, Wendt, Stark, Gottfredson, Tsang & Shallehn, 2020; Dressler, 2019; Penthin, n.d.). Industry experts anticipate that the electrification of vehicles, representing one of the ACES megatrends, will reshape the future of mobility (Capgemini Invent, 2018). EV automakers through not only mastering the technology but providing the right additional services could remain big players in the industry by becoming mobility service providers (Capgemini Invent, 2018). To prevent being run over by new entrants specifying in mobility service provision in the new automotive ecosystem, industry experts argue, OEMs can either engage in strategic partnerships (Dressler, 2019) or transform into one themselves (Accenture, 2018). Accenture (2018) anticipates revenues from mobility services "to soar to almost €1.2 trillion - with profits reaching as much as €220 billion" (p.3).

In the light of the promising market potential for mobility services as well as disadvantages due to the costly parallel production of ICEs and EVs, industry experts argue that incumbent OEMs rich in tradition are being compelled to act quickly. Especially as they are already fighting for pole position against EV-specified competitors (Deloitte, 2019) and technology companies trying to penetrate the market (Stricker et al., 2020). Additionally, OEMs are facing the challenges of increasingly tight CO2 compliance, hesitation and lack of knowledge of consumers, insufficient charging infrastructure, lower after-sales revenues, and the lack of a positive business case (Kempf, Lühr, Schaufuss, Strigel & Tschiesner, 2020). A report by Roland Berger sums up the industry experts' key argument:

> *"Without a radical rethink of current structures, core competencies, product portfolios, complex decision-making structures and production capacities, and without intensifying efforts to digitalize their business, OEMs and OESs [original*

equipment suppliers] will find it hard to survive the growing pressure on margins in the coming years" (Dressler, 2019, par.6).

Chinese EV Companies

Due to generous governmental subsidies, lighter restrictions on license plates and the creation of a charging infrastructure, China depicts the world's fastest-growing market for EVs in recent years (Shirouzu, 2020; Cheng 2021a). The country incorporated the development of New Energy Vehicles (NEV)[14] in their strategic plan, *Made in China 2025*, as one of the central sectors, the country aims to take a global leading role in (Zenglein & Holzmann, 2019). Consequently, China has created a favorable environment for entrepreneurs, ultimately producing large numbers of unicorns[15], half of them particularly targeted towards self-driving and EV solutions (Singh, 2021). The stock market reflects the interests put in these promising EV companies. While NIO, an EV company founded in 2014 (NIO, n.d.), only sold a fraction of Daimler's sales volume, the stock market value of both equaled 61.4 billion euros in 2020 (Focus, 2020).

Due to tough market conditions in China and the government's political agenda, Chinese EV companies are pushed across their border (Tengxun, 2021). According to NIO's co-founder and president, Lihong Qin, "the entry of tech companies like Apple and Huawei into the industry are creating fierce competition for the carmaker" (Cheng, 2021b). China's Chamber of Commerce for Import and Export of Machinery and Electronic Products stated that there had been significant growth in the export of Chinese EVs to Europe in 2020 (Cheng, 2021b). Sales of Chinese EVs in Europe increased more than 13 times compared to 2019 (Jin Rong Jie, 2021). In addition, various Chinese EV companies have announced or made their market entry into Europe: Xpeng delivered the first batch of their G3 electric SUV in Norway in December 2020; Aiways launched their full-electric SUV U5 in Germany in 2020; US-listed NIO announced their entry to Norway in the second half of 2021 and Weltmeister aims to export their EX5 to more than ten European countries (Hongpei, 2021; Cheng, 2021b; Automotive News, 2020; Sohu, 2021). Many Chinese EV companies choose Norway as an entry market into Europe as the country adopted a tariff-free

[14] New Energy Vehicles (NEV) refer to unconventional vehicle fuel types other than gasoline or diesel as a power source. This includes battery electric vehicles, fuel cell electric vehicles, and others (Tai ping yang qi che, n.d.).
[15] Unicorn refers to privately owned startup companies which are valued over 1 billion US-Dollar.

policy for electric vehicle imports and has a comprehensive charging infrastructure (Jin Rong Jie, 2021). According to Forbes (2020), Chinese EV manufacturers already account for over 50% of global EV deliveries. Many Chinese models provide better range-to-price ratios compared to BEVs from established global OEMs (Erriquez, Schäfer, Schwedhelm & Wu, 2020). However, Chinese companies also face various market entry barriers such as localizing their operations and meeting the high safety regulations and standards set by the EU, finding cooperation partners in sales and after-sales as well as brand recognition (Jin Rong Jie, 2021; Huan Qiu Wang, 2020).

4.2 German Premium OEMs

4.2.1 EV Adoption

Regarding factors hindering the further adoption of EVs in Germany, all respondents emphasized above all the inadequate charging infrastructure. The majority further accentuated the range and associated price-performance ratio. The Purchasing Manager (Respondent A) stated that the currently offered price-performance ratio is not suitable for all customers they aim to address. He explained that the low range compared to the ICE does not justify the high price of EVs. Generally, the acceptance of customers represents another factor mentioned, particularly by the Purchasing Manager, the Technical Development (TD) Project Leader (Respondent C), and Sales & Marketing Project Manager (Respondent D). Moreover, the battery depicts a factor three of the four respondents considered a challenge. Respondent A elucidated, consumers are not yet willing to take the risk of buying a battery that quickly loses quality and has only a certain lifespan.

To tackle these challenges, all respondents suggested monetary incentives in the form of higher subsidies. Yet, some also argued that the financial aspect would not be enough to foster EV adoption. Expanding the charging infrastructure network to eliminate customer's doubts and expanding the partner network to provide more services was further emphasized by the Sales Strategist (Respondent B). Both the TD Project Leader and Sales & Marketing Project Manager suggested expanding the product portfolio to address more customer groups. Finally, Respondents A and D stressed turning the EV into a "digital customer experience". The Purchasing Manager

further explained that the advantages of EVs in contrast to ICEs, such as the possibility of a larger interior, need to be exploited more.

4.2.2 Perspectives on BMI

A set of drivers for BMI regarding EVs became apparent through the interviews. First, all participants understood the shift in technology towards focusing more on alternative technologies and the associated shifting customer preferences towards clean mobility as a critical driver. The Sales & Marketing Project Manager for instance particularly stated that for now the BMW group has set on EVs, as they have strategically aligned themselves accordingly.

Second, German policy was identified as a driver. Governmental regulations, CO2 compliance, the EU's Green Deal, and the EV promotion premium were predominantly mentioned by the respondents in category one. Third, the Purchasing Manager and TD Project Leader specifically discussed the development of an EV BM in the context of the other ACES megatrends. Both respondents stated that the EV must be offered along with other services such as autonomous driving or OTA software update capabilities. Fourth, the interviewees laid a focus on the competitors from the U.S. and China specializing in e-mobility. The TD Project Leader stated that Tesla is already one step ahead regarding battery concepts. The Purchasing Manager added that Chinese companies are already further along in terms of software and integrated assistant systems, echoing his own argument regarding the ACES trends. Moreover, the Sales & Marketing Project Manager emphasized that new players entering the market operate faster and have less organizational legacy to consider. Fifth, all respondents considered the increased focus on the customer a crucial driver of innovating the current BM. As stated by the Sales & Marketing Project Manager, customer centricity has not been something OEMs paid much attention to 30-40 years ago, having assumed that the engineers developing the cars had already designed and built the product to the best of their ability and that customers would buy it solely for that reason. The Purchasing Manager further stressed that one must interact more with the consumer than before, especially through additional service offerings beyond the purchase:

We are forced to be customer-oriented and to give a very long promise to the customer that he has made the right purchase decision.

In line with this, the Sales Strategist argued that customer-centricity primarily results from the lack of customer confidence in EVs. OEMs would need to find ways to make EVs more attractive to customers. He further suggested appealing leasing models or a battery guarantee. Issues due to a general lack of knowledge and associated uncertainty of customers regarding EVs were identified by the Sales & Marketing Project Manager. In this sense, OEMs would need to focus even more on the customer and address their fears to motivate a purchase. Sixth, both the Purchasing Manager and TD Project Leader stressed the important role of digitization when establishing a BM for EVs. The respondents referred to Chinese EV companies as pioneers in this field and again stated that they are ahead of Germany, especially respecting software.

4.2.3 Challenges for OEMs

The interviewees identified several key challenges for OEMs regarding the transition of the BM. The software aspect, currently transforming the entire automotive industry, as well as the mindset of the customers, were discussed by the Purchasing Manager. Moreover, the Sales Strategist described the need to be CO2 compliant to prevent paying fines as one of the key challenges. In line with the Purchasing Manager, he further stated that it is difficult to promote EV sales when there are still many concerns on the customer side (customer mindset) regarding the battery. He added that German OEMs are also still lacking some knowledge regarding EV manufacturing. Personnel changeover was another factor identified by several interviewees. The Sales & Marketing Project Manager stated that not only ICE engineers need to be trained to become EV engineers, but also sales staff needs to be retrained and new knowledge acquired. The Sales Strategist and Sales & Marketing Project Manager further explained that the history and legacy of an OEM play a pivotal role in this regard. The 100 years of experience in ICEs, as explained by the Purchasing Manager, might become a burden for manufacturing EVs:

This has a positive effect on the final result, but it surely slows us down. We need to speed up our processes, but we also mustn't start working like startups and making mistakes. Our product is too high-quality for that.

This also relates to manufacturing facilities. In contrast to new entrants, OEMs first have to transform their production lines and plants, which takes time, according to the Sales Strategist. Furthermore, they have long-established partnerships they cannot terminate from one day to another. Besides, the Purchasing Manager identified another challenge concerning the benefits new entrants supported through venture capital have, but German incumbents do not:

[They] are allowed to burn a little money at the beginning. A German OEM cannot do that. Most of them are public limited companies and have to generate dividends.

All interviewees further agreed that German OEMs have recognized the change in the industry and with it the change of the BM, yet clearly too late. Nonetheless, they were confident that the manufacturers are on the right track once transformation ability difficulties can be overcome.

4.2.4 Significance of EV BM Components

The majority of respondents considered *Key Partners* the most important component to consider when it comes to transitioning the ICE BM to an EV BM. Several respondents explained that, in comparison to the ICE, the EV does not require a lot of different suppliers, yet a handful of essential partners. The Purchasing Manager stated that the cooperation with battery companies, such as Samsung, depict a key component underlying the EV BM. He explained:

Without them, it would not be possible [...] we cannot build our own batteries here in large volume. You really have to cooperate with a well-known battery manufacturer, and they will then develop the battery further, increase the range or make it last longer. Then you've simply won something. That will be quite decisive.

This was echoed by the Sales Strategist, who explained that key partners are indispensable since most German OEMs have not yet integrated battery cell production and it takes time for them to do so.

The component *Key Activities* was ranked second highest among the respondents because of the great complexity of the tasks involved in EV supply, for example, regarding the charging infrastructure or connected services, as argued by the Sales Strategist. For the Sales & Marketing Project Manager, key activities were among the most important building blocks as they encompass the big picture of how to make money from EVs. According to him, this also comprises key partners, customers and even society, as these elements significantly condition the activities and how they are executed.

The building block *Customer Relationships* was perceived as the third most crucial element of the EV BM and was considered in connection with the driver customer-centricity by most respondents. As elaborated by the Purchasing Manager, the loyalty to German car brands is still strong in Germany. However, it is only a question of time until new entrants have established their brand and customer loyalty. The Sales & Marketing Project Manager stated that it becomes increasingly important to first educate the customer about topics such as range and charging infrastructure in order to build trust. Regarding this matter, he perceived the positive brand image of his employer BMW as a strategic advantage.

Channels represented the component respondents perceived as least important. This they substantiated with the fact that well-established German OEMs already have mature distribution channels that will not change due to a switch in engine technology. Nonetheless, in about ten years from now, most respondents stated, they would anticipate a major change of channels, as with the further development of the 'car of the future', customers will expect leaner and more seamless distribution processes.

The interviews further revealed two additional components considered essential for an EV BM: The TD Project Leader argued for a building block dealing with *Politics* to include an external perspective instead of merely an internal one focusing only on the product. The Sales Strategist

and Sales & Marketing Project Manager advocated an organization's *Change Management* (i.e., its ability to change), as they explained that a BM should also display the time and scope required to be realized.

4.3 Industry Experts

4.3.1 EV Adoption

All respondents stated that the infrastructure remains the main obstacle regarding EV adoption. Besides still too few charging stations, a challenge all interviewees addressed, the Customer Experience Consultant (Respondent G) elaborated on issues regarding parking spot regulations emanating from the cities as well as the cost of the infrastructure creation. Furthermore, the Market Intelligence Analyst (Respondent H) considered the energy system that must not be overloaded by a sudden increase in EV usage:

> *[...] people's charging behavior must be balanced with the energy system [...]. In this aspect, smart solutions are needed with new pricing models that are aligned with supply and demand. This problem does not exist with internal combustion engines; it is not possible to refuel 'smartly'.*

Further discussed by the Automotive Consultant (Respondent E) was the lack of customer's knowledge regarding the usage of EVs. Thus, OEMs would need to devote resources to informing and convincing customers. Additionally, the narrow product range was claimed to be the second biggest adoption issue of EVs by the Automotive Manager (Interviewee F), which he alluded to the high price range of current models. Moreover, all respondents agreed on the range as another hindrance, as long-distance driving remains too entrenched in Germany.

To foster adoption, the Customer Experience Consultant explained that partnerships need to be established and intensified to leverage more knowledge. This, he stated, would go hand in hand with implementing an externalization strategy, i.e., that more external suppliers should be involved to further develop the EV subject and prevent having to retrain human resources entirely.

Developing more partnerships was also stressed by Respondent F, stating that OEMs need to engage more in dialog with other stakeholders, especially regarding the charging infrastructure. He further advocated an expansion of the product portfolio to stimulate sales.

4.3.2 Perspectives on BMI

During the interviews, the industry experts identified a set of drivers of BMI regarding the establishment of an EV BM. First, all respondents appointed German policy as a significant factor stimulating the further development of EVs and the associated BM. The Customer Experience Consultant and the Market Intelligence Analyst both argued that the government has its preferences for partnerships and depicts the final authority making decisions and creating framework conditions for e-mobility. Thus, according to them, OEMs need to align their strategies and the EV BM to governmental specifications.

Second, the shift in technology was designated a driver, especially by the Automotive Manager, who stated that "e-mobility is the technology of the future, there is no way around it", as he does not perceive other technologies, such as hydrogen, as suitable for passenger cars. In addition, the shift in technology was further related to the interplay with other ACES megatrends, such as connectedness through software, which emerged as another driver of BMI from the interviews.

Third, the threat of Chinese EV companies was highlighted by the Customer Experience Consultant, saying that in combination with the competition from the U.S., German OEMs are strongly pressured to enhance their BM. This was echoed by the market Intelligence Analyst. Successful players of other markets were further designated threats by the Automotive Consultant. This was in line with the Automotive Manager, specifically addressing technology companies such as Apple and Sony. Additionally, he explained that Asian new entrants may not yet have found their place in the market, but examples such as Lexus have shown that they can establish themselves here to a certain extent.

Fourth, customer centricity has emerged from the interviews. The Customer Experience Consultant emphasized that OEMs will rather earn future revenues through the customer than

through the product itself. In this sense, the Automotive Consultant stressed that it would become more difficult for companies to retain customers, especially since new entrants currently revise everything - from customer loyalty to the way service works - as elaborated by the Automotive Manager.

4.3.3 Challenges for OEMs

The respondents identified several challenges German OEMs are facing when transitioning their BM from ICE to EV. The Customer Experience Consultant and Automotive Manager pointed out that German carmakers neither possess the internal knowledge in terms of IT and electromobility nor the manufacturing plants. Further, they argued, they currently do not have enough IT/software specialists, resulting in high restructuring costs. Additionally, the Automotive Manager stated that OEMs have made high profits in recent years with the established business and are therefore reluctant to change. The Automotive Consultant added that OEMs are also struggling to manage the technical progress and amortization of ICE plants from recent investments in parallel to developing EVs. Furthermore, both Consultants and the Market Intelligence Analyst highlighted the challenge of retaining an 'emotional brand' image. As explained by the Automotive Consultant, since EVs do not have the same familiar engine sound as ICEs, representing a key purchasing argument, OEMs need to find new ways to create an emotional brand. The Market Intelligence Analyst further remarked:

> *German OEMs are losing their image as pioneers of e-mobility. If you were to ask consumers now what their dream e-car would be, most would answer with Tesla. [...] the established brand image is hard to change.*

Another point the respondents highlighted is the increased competition from the U.S. and China. The Customer Experience Consultant explained that new entrants will always dare to do more. The Market Intelligence Analyst argued that this is primarily due to the mindset:

Chinese and Americans [...] have a much more "just do it" attitude. From my experience, Germans tend to see the 5% risks rather than the 95% opportunity, and this mentality is very strong among German OEMs.

Both consultants highlighted additional advantages of new entrants, such as not being restricted by legacy structures and having a huge investment potential and fundraising opportunities. The Automotive Consultant further added that new entrants have faster processes, results and overall fewer approval processes compared to the German incumbent OEMs. However, the respondents also touched upon disadvantages such as difficulties building up a brand image and the lack of an existing customer base (Respondent G). Other disadvantages mentioned are the lack of a dealer structure and customer loyalty, difficulties scaling up the operations (Respondent F), establishing trust among stakeholders and the government (Respondent G), as well as quality issues (Respondent E).

Regarding the Chinese EV companies' positioning in the German market, the Automotive Manager did not think that new Chinese EV companies have much of a chance in the German market due to VWs advancement in the EV market. However, both consultants and the Market Intelligence Analyst believed that Chinese EV companies have the potential to build up a customer base if challenges such as brand image and quality are overcome.

4.3.4 Significance of EV BM Components

All four respondents pointed out that *Key Resources* is the most important EV component for two reasons. First, they defined personnel as a key resource that needs to either be retrained or newly hired. As pointed out above, the interviewees highlighted that incumbents no longer need mechanical engineers, instead IT and electrical engineers are required. Second, the interviewees defined the required new raw materials as a key resource since materials used in ICEs such as diesel injectors become obsolete. In contrast scarce materials used in battery cells, such as nickel and cobalt, become essential. The Automotive Consultant stated:

We in Europe have failed to build up a battery supply chain for the last ten years. We are now trying to catch up, but it's rather sad. I mean, there are five major battery cell manufacturers on whom we should perhaps not become completely dependent. [...] they are all based in China, Japan, or Korea. That tends to be very, very risky.

Another crucial BM component pointed out is the *Cost Structure.* The Customer Experience Consultant highlighted the uncertainty of emerging costs related to EVs. Further, the Market Intelligence Analyst added that the cost structure of EVs is different, as overall less components are needed, yet the battery - the centerpiece - is expensive. The Automotive Consultant elaborated further:

The challenge with PHEV is that you have both, the battery and the combustion engine. So these cars have an extremely poor profit margin. Then you also have to cover the pure combustion engines [...] and another completely battery-powered vehicle... You have to manage [...] to manufacture everything at the same time. [...] OEMs are struggling to find a balance.

He added that especially during the transition period, OEMs must manage their investments very well and outsource a lot.

Leading to the third significant BM Component identified - *Key Partners*. According to both Consultants, they are crucial as OEMs need to acquire the knowledge they lack as well as new materials from others. In addition, the Automotive Consultant and Market Intelligence Analyst added that in the context of e-mobility, energy companies are crucial partners to not only jointly expand the charging infrastructure, but also to provide energy to the consumers.

Furthermore, the interviewees described *Customer Segment* as the least important component, believing that it will not change significantly. According to the Automotive Manager, the current lack of an extensive product portfolio does not enable customer segmentation, however, he believed that could change as more models are launched.

Lastly, additional factors influencing an EV BM were identified. The Customer Experience Consultant and Market Intelligence Analyst highlighted that an *Outside Perspective* considering political and legal dimensions should be displayed, as the government sets the framework conditions for e-mobility.

4.4 Chinese EV Companies

4.4.1 EV Adoption

The interviews revealed that all Chinese EV company employees identified the lack of a developed charging infrastructure as a major hindrance to EV adoption. The Sales Consultant (Interviewee I) particularly stated that the infrastructure is not well covered, especially in rural areas. Thus, it becomes inconvenient for customers to charge. Another customer pain point identified by the respondents revolves around the battery: the uncertainty of battery life, the safety, and the high costs involved in battery replacement. Other concerns mentioned are the high costs of EVs to comparable ICE models as well as the significantly lower residual value of EVs. All interviewees agreed that it is also the government's responsibility to support the charging infrastructure expansion. Furthermore, OEMs would need to be able to not only ensure good after-sales services but derive revenue from these activities and guarantee the residual value of BEVs to promote a wider adoption.

4.4.2 Perspective on BMI

All respondents have pointed out the role of the government as an important additional component in an EV BM impacting BMI. Besides the responsibility to expand the charging infrastructure, the Sales Consultant saw an increasing commitment of countries worldwide to ban the sales of fossil fuel vehicles as accelerating the transition from ICEs to EVs. The Innovation Research Manager (Respondent K) added that especially in China,

[...] if the government releases a new policy, what can you do? You can only follow it right. [...] Maybe you will not be allowed to sell your product anymore, so I think environmental related policies need to be considered and reviewed.

While the Sales Manager (Respondent J) and Innovation Research Manager acknowledged that there are alternative technologies, such as hydrogen and fuel cells, all respondents believed that none will become equally as relevant as EVs in the near future. The Sales Consultant argued:

Currently, every country in the world is promoting electric vehicles, which shows that the direction of energy exploration has been decided.

Furthermore, the respondents emphasized a shift towards a more service-oriented product offering. The Innovation Research Manager stated:

I certainly think it is a trend for OEMs now to not only sell the product, but also offer services. [...] This is also included in the mission of premium OEMs to offer premium mobility.

In addition, the Sales Consultant provided an example of NIO, stating that they built a unique value proposition and mission by putting excellent service offerings at their core operation. Besides, the Innovation Research Manager thought that people do not necessarily want to buy cars anymore in the future. Instead, they would make use of mobility services. However, the interviewees also identified challenges involved in the transition to a mobility service provider, such as high costs to upgrade the service offering and an unprofitable business case. For the given reasons it is difficult to convince the top management to commit to such a model according to the Innovation Research Manager. In addition, the interviewees highlighted the role of new market players and the progressing digitization influencing the EV BM. The Innovation Research Manager elaborated:

At the recent Shanghai Motor Show there were so many internet companies that also started to work on or produce EV models. So it's not only electrification, but also

digitalization that plays a bigger role. Competition can work as a trigger, such as Tesla which paved the way for EVs.

4.4.3 Challenges and Opportunities for New Entrants

The respondents identified several challenges new entrants or startups are facing in the German market, especially compared to incumbents. The Sales Manager stated that EV startups are mainly leveraging direct sales operations, which yields that they cannot guarantee the timeliness and convenience of after-sales services. Other disadvantages listed by her and the Innovation Research Manager are the lack of customer brand awareness and difficulties establishing a network. The Sales Consultant further added that customers will not be willing to pay a high price for an unknown product with no brand history. Additionally, the Innovation Research Manager argued that new entrants are faced with doubts about the quality of the product:

I honestly think it'll be difficult for them to sell cars in the German Market. People in Europe still have a biased perception on products and brands from China. There is a great suspicion towards such products and the perception that China is not good at innovative technology [...] still exists.

However, the interviewees also highlighted advantages new entrants hold. While perceiving the lack of a customer base and brand awareness as challenges, the Innovation research manager and sales consultant still identified the biggest advantage as having no historical legacy so that the business can be established without restrictions. As explained by the Innovation Research Manager: "They can fail fast and fail early and start with something again". Additionally, she pointed out that new entrants have greater flexibility and agility regarding their organizational structure and are using a customer-centric approach.

In terms of the positioning of Chinese EV Startups in Germany, the Sales Consultant and the Innovation Research Manager stated that they think Chinese EV companies will settle in the low-end market. The Innovation Research Project Manager further differentiated and explained that Chinese EV companies will not be "[...] a serious challenger to premium brands such as Audi,

Mercedes or BMW, but in the low-end or volume market they can gain a foothold, if the perception of Chinese brands changes". The Sales Manager, on the other hand, placed great faith in the positioning of Chinese EVs in Germany by stating that the companies would challenge German incumbents' leadership position through attractive price-performance-ratios by taking the technological route - similarly to the mobile phone brand Xiaomi. The company reached a high market share with a high value to price offering. All three respondents acknowledged the product attributes of Chinese EVs as being of decent quality, highly digitalized and low cost. Besides, the Sales Consultant stated that European OEMs are putting technology and quality in their focus and have accumulated technical expertise. According to the Innovation Research Manager, this is what Chinese EV companies would like to access through their expansion into the European market. The respondent also perceived Chinese EV companies to be superior compared to German incumbents regarding big data and digitization-related topics.

4.4.4 Significance of EV BM Components

All respondents placed the highest importance on the *Value Proposition* building block. According to the Innovation Research Manager, OEMs need to consider what kind of products and services they want to launch first. As elucidated by the Sales Consultant, the additional service offered by a car manufacturer is what sets it apart in the competitive market. He specified that customers expect innovative digital features especially in the context of EVs and in combination with digitalization.

Another significant building block identified are the *Key Resources*. The respondents stated that it is crucial to define the necessary resources, not merely in terms of raw material but also human resources, as they argue those are essential elements in an EV BM. As previously highlighted, the Innovation Research Manager stressed the importance of acquiring expertise in quality standards and electrical engineering through human resources.

Further, decisions on what to outsource and what to build in-house would need to be made, leading to the third imperative component - the *Key Partner*s. The interviewees stated that securing the right partnerships to outsource core components, such as batteries, are vital for an EV BM since

such capabilities cannot easily be developed in-house. Apart from being necessary for the production, finding the right partner is also crucial for the sales network, according to Respondent K. She further added that partnerships with local suppliers are essential for a timely delivery.

The Respondents agreed that the *Cost Structure* is the least important building block at the present time. The Innovation Research Manager argued that "gaining customer acceptance is the priority". However, she further noted that in ten years, the significance of the BM components would significantly change:

> *In the beginning you invest. So the aim is to build up the brand, to make it stronger and visible to the customers and only with a high acceptance of the customer you occupy the market. But when it's already established in the market, then for sure, you have to work on a profitable business model. [Then] the cost and revenue streams become more important.*

5 Discussion

Building on the empirical findings, this chapter aims to analyze and compare the different perspectives of each interviewee category. Additionally, the chapter intends to discuss the results with respect to the reviewed literature. In this regard, the identified findings can further be positioned in comparison to the existing research on BMs and BMI.

In the following subsection, the internal factors are discussed and the perspectives of the three categories contrasted to highlight similarities and differences. Subsequently, this step will be repeated for the external factors as well as the organizational conditions. Prior to concluding with the adjustments to the preliminary theoretical framework based on the additional findings, resulting in three frameworks according to each category.

5.1 Internal Factors

The findings regarding the perspectives on the three most essential internal factors revealed multiple similarities and differences, of which the most significant ones are highlighted in the following.

Key Partners

This building block depicts the element each category considered highly relevant and the one highlighted as most important in the preliminary framework based on the literature. Category one (German premium OEMs) stated that the dependence on partners, especially battery companies, is currently still an underlying premise of the EV BM. In line with this, Nieuwenhuis, Cipcigan and Sonder (2020) and Donada (2013) argue that EVs, requiring specific materials, force new supply chains, which in turn enforces new partnerships. In contrast, category two (industry experts), who also considered the element highly significant, justified their choice with more than just the need for partnerships because of battery procurement. Their more holistic view further comprised partnerships regarding the energy system required to foster EVs as well as partnerships for increasing and leveraging knowledge needed for EV production. This is in line with Krommes and

Schmidt (2017), elaborating that partnerships help OEMs to gain competencies in areas that are novel from their core business. Like category two, category three (Chinese EV companies) ranked key partners the third most relevant element, stating that they are crucial to establish a sales network in a new market, such as Germany. Moreover, they referred to outsourcing options for components such as the battery, in accordance with category one. As all three categories placed great emphasis on the key partners, the empirical results imply that the component is in fact one of the most significant elements regarding an EV BM on an overarching level. This would also be in line with the assumption by Xue et al. (2012) and Kley, Lerch and Dallinger (2011), stating that OEMs need to particularly consider the interactions between new partners and stakeholders to develop a profitable BM for EVs. This applies to both new entrants and incumbent OEMs.

Key Resources

As highlighted by several contributions to the literature, EVs require specific materials different to ICEs (e.g., Nieuwenhuis, Cipcigan & Sonder, 2020; Donada, 2013). Hence, the finding that key resources were prominently positioned among the three most relevant components by categories two, three (and the preliminary proposed framework) was anticipated. Categories two and three similarly justified their choice: Raw materials for battery production/procurement are essential for any EV and fundamental changes in human resources required for the production indispensable. Category one did not rank the building block in their top three, however, in line with categories two and three, the interviewees referred to the battery and raw materials as crucial factors to consider when they discussed the importance of key partners. Furthermore, again in accordance with the other categories, they considered re-educating personnel a tremendous challenge, which aligns with the picture the secondary data has drawn of German incumbent OEMs, particularly highlighting the large financial outlay to retrain personnel and retool production plants. The findings regarding key resources further prove Bohnsack, Pinkse and Kolk's (2014) argument, who already a few years ago determined that many aspects of the emerging BM for EVs will result from battery limitations, hence a key resource.

Cost Structure

This building block was perceived as highly relevant by category two, aligning to the preliminary framework. Their perspective is not least based on the associated uncertainty of emerging costs

and the EV's different cost structure compared to an ICE. Category two further emphasized that OEMs need to particularly consider the cost aspect in their EV BM during the transition from ICEs to EVs, which can be linked to Kley, Lerch and Dallinger (2011), suggesting that OEMs should focus on mobility services, such as car-sharing, to expand their customer base at low EV operating costs. Moreover, according to Zarazua de Rubens et al. (2020), there is currently no profitable business case for EVs, further emphasizing that the cost structure represents a crucial element of the EV BM. Interestingly, both the Chinese new entrant and German incumbent OEM employees did not consider cost structure a component OEMs should pay specific attention to at the present time. A possible explanation for these different perspectives might be that both OEM categories are aware of the availability of their financial resources: the Chinese EV companies mainly through the stock market, as revealed by the secondary data, and the German incumbents through their captive financial services providers. On the contrary, the industry experts, primarily consultants, might be naturally more concerned about optimizing processes to cut costs as part of their job and thus consider the element more important.

Value Proposition

As elaborated by Tongur and Engwall (2014), OEMs can either continue to win customers through innovative technologies, like they used to, or offer the new technology in the scope of a value proposition of a product-service system. Kley, Lerch and Dallinger (2011) as well as Hall, Shepherd and Wadud (2017) further stressed to include more services to expand the value proposition in the context of electromobility. Following the literature, but in contrast to the remaining categories, the Chinese respondents (category three) ranked the value proposition as the most important element of the EV BM. They especially referred to digital features and offers surrounding the EV, which is again in accordance with the literature, highlighting the successful strategy of Tesla to position themselves as the leading EV company: through integrating IT in their BM, allowing for more in-car services (Chen & Perez, 2018). Category three particularly referred to Chinese EV companies as superior to German OEMs regarding digitization. The Chinese new entrants' focus appears to currently lie more on offering the customers an EV with more services and features - a value proposition the German OEMs would also like to provide in the future, as became apparent in the interviews. Interestingly however, it was stated in category three that the Chinese would equally like to focus more on quality and technology, following the German

example. It thus shows that Chinese new entrants are aware of the hygiene factors required in the German market, yet that they plan to enter the market with a value proposition that contains both the quality and the digital services. To an extent, the insight that the German OEMs and industry experts did not consider the value proposition one of the most significant components stands against what Morris, Schindehutte and Allen (2005) have extracted from their research on BM design - namely that the offerings (i.e., value proposition) and key activities are predominantly found in all generic BMs, and therefore represent an especially important element.

Key Activities

Category one understood the key activities to be of second highest importance as they encompass the big picture of how the organization earns money from EV sales and directly interacts with (or even comprises) multiple other elements of the BM. In contrast, neither category two nor three have devoted much attention to the activities. Additionally, the reviewed literature on BMI in the automotive sector has not put much emphasis on the element either. This finding could be substantiated by the fact that OEMs naturally have an organizational-centric view. Thus, since they have about 100 years of experience and history in ICE manufacturing, the challenges and changes with respect to shifting the production to EVs may appear clearer to them than they do to a much smaller, younger - and pure EV-manufacturing - new entrant.

Customer Relationships

The relationship with the customer was an often-cited aspect among the categories. Particularly the German OEMs considered customer relationships one of the three most important elements for an EV BM. For one thing, the interviewees related the building block to retaining customer loyalty with the new product through the emotional brand they have established over the years. This was in accordance with category two, stating that it will be a challenge for OEMs to retain their emotional brand, that was built purely on ICEs, and further aligns to Altenburg, Schamp & Chaudhary (2016), stating that the required capabilities for EV manufacturing threaten incumbents' core competencies. For another, category one related it to the importance of educating customers first to encourage them to purchase an EV. This aligns with Kley, Lerch and Dallinger (2011), inviting automakers to address customer concerns to foster EV adoption. Moreover, it can be linked to Stryja et al. (2015), emphasizing that only by putting the customer in the focus when

creating a new BM, additional services and market gaps can be identified, which incumbent OEMs naturally strive for. Customer relationships have further been largely emphasized in the literature: Wells (2013) and Williander and Stålstad (2013) stress that the sell-and-disengage approach common in the automotive industry is not suitable for EVs, as too many uncertainties exist on the customer-side that need to be addressed through service offerings beyond the purchase. Teece (2010) emphasizes businesses' need to become more customer-centric, especially regarding the increased use of customer data. Even though categories two and three evidently also recognized the importance of addressing the customer more and embracing customer-centricity, they did not deliberately rank customer relationships in the three most significant EV BM components. One reason for this might be that incumbent OEMs, in contrast to new entrants, already possess a large customer base from which they earn most money, and thus particularly consider this building block.

Concluding, the findings indicate that the reviewed literature on BMI in the automotive industry argues from a more holistic point of view, a perspective that is in line with the one of category two (both considered *Key Resources*, *Cost Structure* and *Key Partners* the most significant components). Yet, the findings for incumbent and new entrant OEMs revealed that these players have different primary foci regarding the establishment of an EV BM. This could be because industry experts have a broader insight into the subject based on their experience with different companies and brands. In contrast, incumbent and new entrant OEMs have a very company-centric perspective. This would prove Kley, Lerch and Dallinger (2011) and Zott, Amit and Massa (2011), emphasizing that OEMs need to look beyond the organizational level and start analyzing the entire system they are operating in. In the following, this becomes more evident as differences and similarities regarding the external influential elements are discussed.

5.2 External Factors

All categories have addressed the four external factors *Infrastructure*, *Technology*, *Competition*, and *Government* illustrated in the preliminary framework. Within each category, however, the perceived significance of influence on the EV BM differs. Further, the categories identified distinctive interrelations between components or added an additional block, portraying diverse

perspectives on the external factors impacting an EV BM. In contrast to Richardson (2008), claiming that a BM should not display a firm's ecosystem, all interviewees stressed the significance of external factors, particularly at the present studied time.

Government and Legal Regulations

According to Christensen and Johnson (2009), BMI occurs through a disruptive technology, making it more affordable for another set of people to use or own the product. However, as pointed out above, this does not apply to EVs. Instead, the push for EVs mainly stems from the political agendas of governments induced by environmental concerns (Rietmann & Lieven, 2019; Augenstein, 2015). In line with the existing literature, the interviewees in all three categories reached consensus about the predominant role and influence of the government on an EV BM. All categories further highlighted *legal regulations* implemented by governments as having a substantial effect on the EV BM. It has thus been added to the framework as a standalone block. Respondents in category one placed the highest importance on this factor, particularly on legislation from supranational levels such as the EU. In addition, the interviewees emphasized EV promotions through subsidies by the government, yet concluded that this would not be enough, which reflects Broadbent, Drozdzewski and Metternicht's (2017) argument that governments need to implement multiple incentives. Category three further highlighted legislations, such as the ban of fossil fuel and safety regulations implemented in the country. The latter point has especially been highlighted by the respondents since achieving the high EU safety standards is perceived as a market entry barrier. All categories agreed that the government plays a pivotal role as an accelerator for a wider and faster adoption of EVs, thus pressuring OEMs to explore fitting BMs.

Charging infrastructure

Although the government's role is perceived as an influential factor, the most significant external influence identified by all categories is the charging infrastructure. By examining the example of Norway, the country with the highest coverage of charging stations and the marketing leading position for the highest EV adoption worldwide (Haugneland, Bu & Hauge, 2016), a certain interrelationship between the extensiveness of the charging infrastructure and its effect on an EV BM is indicated. In the framework, this interrelation is illustrated with double-headed arrows. In addition, Chinese EV companies often choose Norway as their entry market. Justifying their

decision, they often highlighted the comprehensive charging infrastructure. The existing literature, too, depicts the charging infrastructure as one of the greatest customer concerns (Kley, Lerch & Dallinger, 2011; Williander & Stålstad, 2013). This was in line with all categories, deeming an insufficient charging infrastructure as a major hindrance of EV adoption. While category one did not elaborate further on this challenge, category two highlighted the increasing importance of *energy network* collaborations (energy and utility companies) as key partners to expand the charging infrastructure while being able to provide energy to their customers. The industry experts further stressed that OEMs need to engage more in dialog with stakeholders involved in the infrastructure to develop new pricing models and smart solutions for the energy grid. This interrelationship, depicted as a triangle in the framework, is further supported by the literature proposing smart grid solutions to mitigate peak energy times (Nieuwenhuis, Cipcigan & Sonder, 2020; Altenburg, Schamp & Chaudhary, 2016; Laurischkat, Viertelhausen & Jandt, 2016). Category three further argued that the charging infrastructure is especially deficient in rural areas and stressed that it is also the government's responsibility to expand it. Therefore, the infrastructure and government are factors influencing each other, as illustrated by the double-headed arrow in the framework. This perspective of a highly influential role of the government can be linked to the respondent's experience of living in a policy-driven country.

Competition

Industry experts and Chinese EV company employees valued competition highly as an influential driver of BMI. While category one acknowledged the impact of competition, they did not perceive it as important as the aforementioned categories. However, the overall perception in the category persisted that Chinese companies are further along in terms of software and assistant systems. Nonetheless, German OEMs employees showed confidence in the company's ability to catch up. Category two highlighted the competition from the U.S. and China as pressuring OEMs to adapt their BM. They further addressed additional competition from technology companies intensifying the competition, which should not be taken lightly. In this regard, category three also pointed out that internet companies are increasingly entering the EV market, enabled through the parallel development of digitization. This aligns with Amit and Zott (2015), stressing that companies need to be aware of non-traditional competitors from other industries trying to enter the market. The respondents further emphasized how competition can work as a trigger to innovate, aligning to

Kley, Lerch and Dallinger's (2011) finding that first movers are entering the market and are prepared to overturn traditional business structures. Moreover, category three highlighted that Chinese EVs are cheap, while category one stated that most EV models in the German market are too expensive. Thus, when Chinese EV companies enter the German market, this could cause a low-end disruption, as defined by Christensen and Johnson (2009), where Chinese companies take over a certain share of German OEMs' businesses (Christensen, Raynor & McDonald, 2015). However, Chinese EV company employees viewed German incumbents as serious challengers since they already have an established brand image and a loyal customer base, especially in their home market.

Technology

Merged under the umbrella term technology, each category weighted the influence of this block differently, while highlighting different or additional components illustrated in the bullet points of the technology block. For instance, category three especially accentuated the technical development and concerns regarding the battery. The respondents in this category repeatedly mentioned the uncertainty respecting the battery life and safety as well as the low residual costs of an EV as pressing customer pain points. This goes in line with Donada (2013) and Altenburg, Schamp and Chaudhary (2016), identifying challenges of a wider EV adoption such as the battery life and limited EV performance in terms of range. Further, this reflects Bohnsack, Pinkse and Kolk's (2014) argument, who highlighted the battery as centerpiece of the EV technology; therefore, many aspects of the emerging business models for EVs result from limitations regarding the battery. Further, most OEMs do not control the technological progress of the battery and are highly dependent on external partners, as pointed out by category two. Besides, all categories, particularly category three, stressed the development of *digitization* as an influence on an EV BM, highlighting that EVs cannot be viewed apart from other ongoing trends.

The German OEM employees further pointed out that the lifespan and quality of batteries are customer pain points. In this regard, the interviewees proposed a concrete BM and additional services, such as leasing models with favorable conditions or a battery guarantee, which is reflected in the literature by Williander and Stålstad (2013), who identified new ownership and service models in the context of electromobility to reduce battery concerns. This category, however,

particularly emphasized the *software* aspect intertwined with the ACES trends. The respondents highlighted that EVs have to be offered along with other services such as autonomous driving or OTA software update opportunities. This category's answers correspond with the above-mentioned competition factor, which the interviewees perceived as a threat regarding software capabilities. In addition, the interviewees highlighted that the transition to a more software and service-oriented company is regarded as a major challenge to be overcome by OEMs and elucidated further in the following chapter. Lastly, the second category put the least emphasis on the technology factors, although the respondents argued similarly to the first category that the shift to EV technology needs to be considered in the interplay with other ACES trends. Additionally, they argued that the C (connectivity) in ACES can be enabled through software, further stressing the paramountcy of acquiring software capabilities as mentioned by category one. The interviewees moreover stressed that customers in Germany are used to a certain mileage a vehicle enables one to drive. As also discussed by Williander & Stålstad (2013) EVs cannot provide this at the moment due to battery limitations. Electric vehicles are currently still developing, and the technology is inferior to ICE technology in some regards, yet BMI can become crucial as a better BM can accelerate commercialization and overcome this inferiority, as elaborated by Chesbrough (2007).

To sum up, all categories highlighted an additional external factor labeled as Legal Regulations in the framework. This encompasses environmental regulations derived from targets set by the EU. Category three further added their perspective of perceiving high EU safety standards as a market entrance barrier and the ban of fossil fuel as an accelerator of EV adoption. Overall, highlighting that the legislation set by authorities has a significant impact on an EV BM. The Chinese perspective particularly highlighted the role of the government as an influential factor on an EV BM, providing subsidies, setting political targets, adopting regulations and most notably being responsible for expanding the charging infrastructure. The industry expert perspective emphasized the role of partnerships and collaborations as the biggest external impact on an EV BM. In contrast to the Chinese perspective, they understand a partnership with energy companies as crucial to expand the charging infrastructure and to offer other energy-related services. The German OEM perspective highlighted especially the insufficient infrastructure as a hindrance of EV adoption.

This aspect is acknowledged by all categories as the biggest obstacle to be overcome for a wider market penetration.

5.3 Organizational Condition

The interviews revealed that all categories understand an organization's condition, its status quo, as a crucial driver influencing the EV BM's components. The categories' different perspectives indicating the high relevance of organizational condition, with respect to both incumbent and new entrant OEMs, are discussed in the following.

Incumbents

In the literature, it is argued that incumbent OEMs struggle to implement new sales approaches due to existing partnerships and interdependencies. This is although it can be considered necessary, since EV sales show a negative margin (Zarazua de Rubens et al., 2020). These in some ways burdensome yet long successful partnerships appear to be slowing incumbent OEMs down, regarding EVs. However, as stressed by category one, OEMs with a long history cannot simply terminate them overnight. It can thus be argued that the characterized phenomenon depicts path dependency and, in line with Chesbrough and Rosenbloom (2002), the incumbent OEM employees described a situation when a successful BM (here the ICE BM) "constrains the subsequent search for new, alternative models for other technologies [...]" (p.2). The respondents in category one further highlighted the large number of employees as a contributor to slowing down the transition process. The interviewees emphasized that not only engineers, but also sales staff needs to be retrained, while new software and IT specialists need to be recruited. Additionally, German OEMs possess great assets in terms of manufacturing plants suited for ICEs that need to be transformed. With regard to their ICE business legacy, category one particularly highlighted *Change Management*, as the capability to transform the above-mentioned existing structures, as crucial for an EV BM. This awareness of requiring change, which has been apparent throughout all interviews, contrasts Tongur & Engwall's (2014) statement that there has not been a widespread realization that ICE competencies are at risk. Moreover, the respondents raised the difficulty of creating an emotional EV brand, which is in accordance with Funk & Strigel's (2020) finding that the perception of a competent incumbent in ICE vehicles does not directly transfer to EVs.

Respondents in category two put the strongest emphasis on organizational conditions. In addition to the above-mentioned points, the interviewees stressed high restructuring cost as a factor amplifying path dependency and inertia. However, category three also described several advantages of incumbents with respect to their organizational condition, such as having an established network, a customer base, technical expertise, and high-quality standards to build on. Further, category three implied that an established brand image enables the company to set a higher pricing than new entrants.

New Entrants

In line with Amit & Zott (2001) and Bohnsack, Pinkse & Kolk, (2014), category two argued that new entrants are not restricted by legacy structures and take novelty as a main driver for new service offerings. This aligns with the ranking of internal factors by category three, where value proposition was assigned the highest priority. In accordance with Zarazua de Rubens et al. (2019), Kley, Lerch and Dallinger (2011) and Bohnsack, Pinkse & Kolk (2014), the interviewees identified that new entrants leverage leaner sales approaches such as direct-to-sales. However, category three emphasized that this can be viewed as a disadvantage, as a sales network is still needed to be able to offer after-sales services and promote sales. Additionally, both the literature and interviewees argued that additional revenues must be explored, which respondents in category one and three considered an advantage for new entrants. As put by category one: "[They] are allowed to burn a little money at the beginning" and by category three: "They can fail fast and fail early and start with something again". German OEMs, however, as explained by category one, are not able to do that. Categories two and three further highlighted that new entrants have greater flexibility regarding their organization structures, leading to faster processes. Furthermore, category three highlighted new entrants are leveraging a customer-centric approach from the beginning, which incumbents are only starting now trying to imitate. However, categories two and three further identified disadvantages of new entrants such as concerns about the quality, a biased brand perception towards Chinese products, the lack of a customer base, and difficulties establishing trust and partnerships to scale up the operations.

Altogether, the findings indicate that the organizational condition of a company illustrates the baseline on which an EV BM is built on. For incumbents, challenges such as organizational inertia

must be overcome. Although an organization's legacy provides certain advantages, it can also restrain them, especially in a transition period. In comparison, new entrants can start their business from scratch, however, this also results in obstacles that need to be overcome to succeed in the market.

Subsequently, the views of the three categories have been synthesized, each in an empirical framework illustrating the discussed similarities and differences in strategic perspectives of employees of German premium OEMs, automotive industry experts and employees of Chinese EV companies.

5.4 Three Perspectives on the Significance of EV BM Components

With the intent of answering the proposed RQ, a juxtaposition of three strategic perspectives was conducted in this study. Building on the preliminary theoretical framework established from and presented in the literature review, three distinctive frameworks were developed through the analyzed data. Pursuant to the preliminary proposed framework, the different sizes of the white and grey boxes depict the elements' different weightings regarding their relevance for a potential EV business model. The same principle applies to the box *organizational condition*.

German Premium OEMs

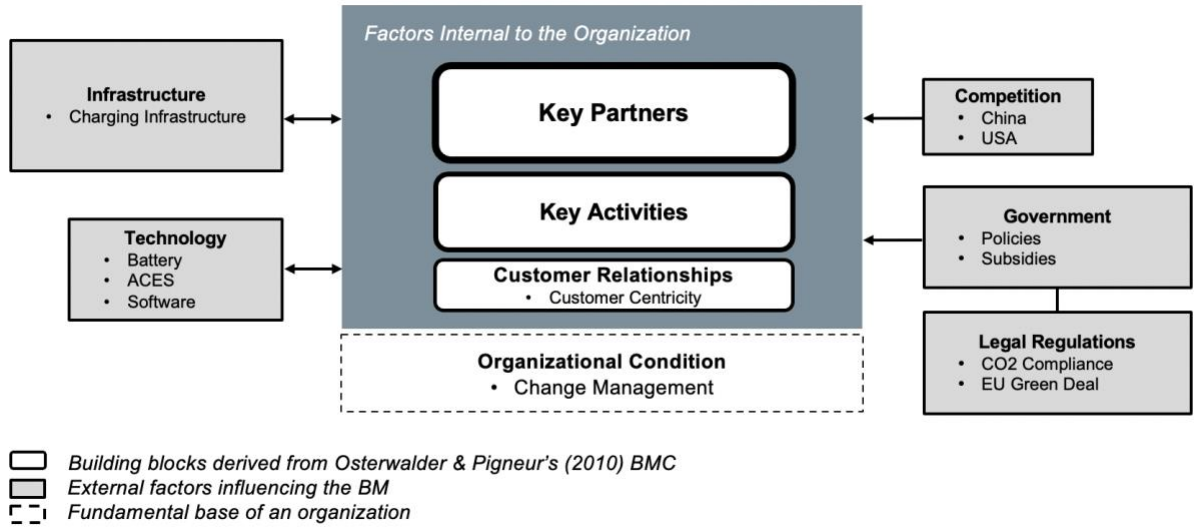

Figure 5: *Empirical framework depicting the most significant EV business model components to be considered from an OEM perspective (created by authors based on the findings for category one: German premium OEMs)*

Industry Experts

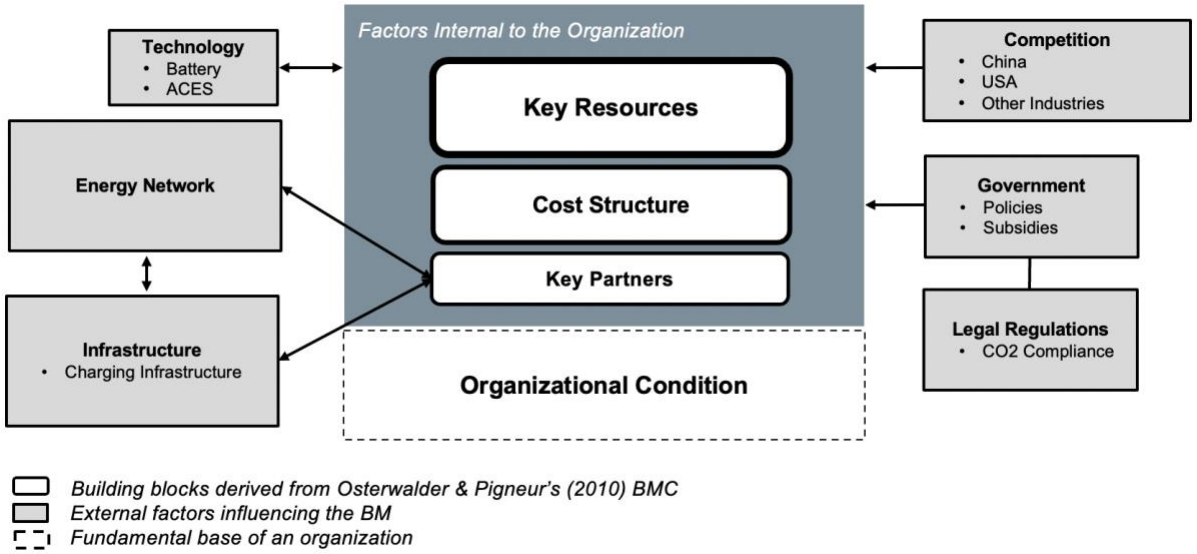

Figure 6: *Empirical framework depicting the most significant EV business model components to be considered from an OEM perspective (created by authors based on the findings for category two: automotive industry experts)*

Chinese EV Companies

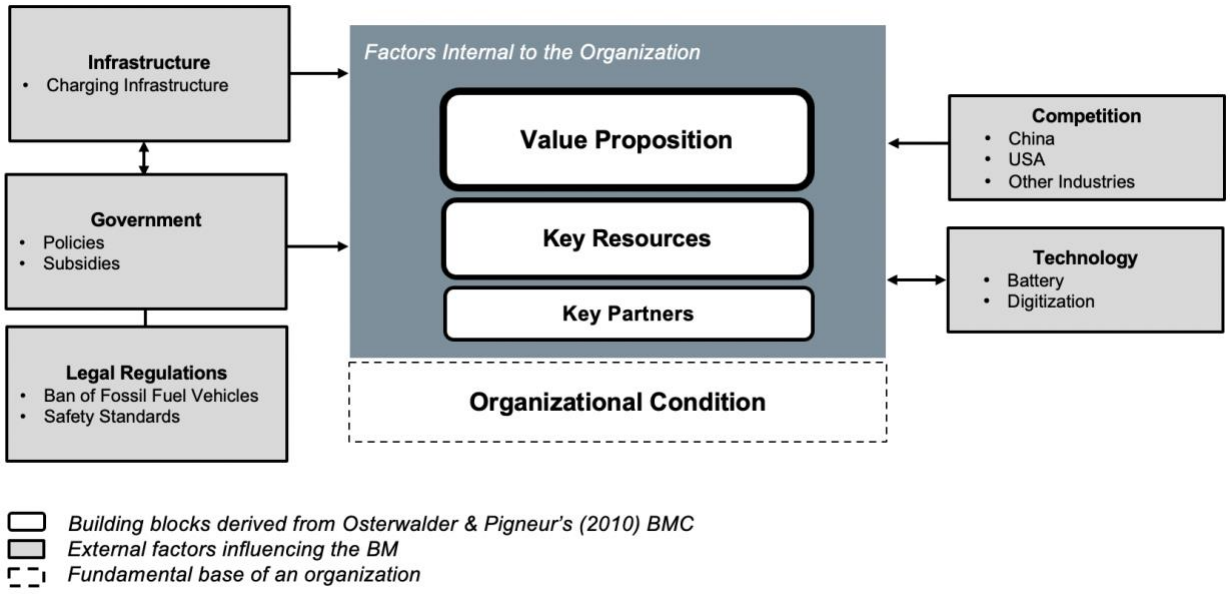

Figure 7: *Empirical framework depicting the most significant EV business model components to be considered from an OEM perspective (created by authors based on the findings for category three: Chinese EV companies)*

6 Conclusion

The purpose of this research has been to enhance the understanding of the varying views of different market participants on business model innovation in the context of electric vehicles. Therefore, the significance of business model components and their drivers was studied using a multiple-case study approach with the intent to answer the formulated RQ:

How do strategic perspectives of industry experts, incumbent, and new entrant OEMs differ on the significance of business model components and their drivers in the context of electric vehicles?

The conducted expert interviews allowed the identification of several key elements, consolidated in three distinct empirical frameworks (Figures 5, 6 & 7), illustrating each case's perspective. This finding shows that there are in fact variations among incumbent, and new entrant OEMs' as well as industry experts' conception of important BM components and drivers with respect to EVs. Whereas the industry experts were found to be primarily in line with the literature, particularly emphasizing the BM components *Key Partners*, *Key Resources* and *Cost Structure*, as well as the energy infrastructure as an external driver, the German premium OEMs and the Chinese EV companies (new entrant OEMs) deviated. Nonetheless, the findings revealed key partners as the component that all studied cases perceived to be significant regarding electric vehicles, which aligns with the literature.

The German OEMs depicted *Key Partners*, *Key Activities*, and *Customer Relationships* as the most important elements. Further, they highlighted the infrastructure and government (particularly legal regulations) as the most crucial external factors impacting the EV BM components.

The Chinese EV company employees described the *Value Proposition*, *Key Resources*, and *Key Partners* as most relevant EV BM components. In contrast to the other categories, their focus regarding external factors impacting the BM lied primarily on the role of the government and the infrastructure, as they argued for interactions between the two factors.

Another key finding relates to the perceived relevance of organizational condition, a factor established from the existing literature and proved through the empirical findings, as all surveyed categories agreed on its significant impact on the business model.

6.1 Theoretical Implications

Based on the findings this study has brought to the fore, several implications to the academic literature can be suggested. Even though the existing literature primarily discusses how to design a business model and what elements to include, the different components' weightings, depending on the area of application, have so far not been researched in depth. Aligning to Foss and Saebi (2016), criticizing the lack of detailed academic research on business model innovation, particularly on moderators and boundary conditions, this study contributes to literature by highlighting additional factors that need to be considered, depending on different industry players, and their respective significance. In this regard, we have further added to the rather scarce field of BMI in the automotive sector, as requested by multiple scholars (e.g., Bohnsack, Pinkse & Kolk, 2014; Krommes & Schmidt, 2017).

Apart from this, our study contributes to the literature by demonstrating how the BMC theory by Osterwalder and Pigneur (2010) can be extended, especially with regard to its applicability for the automotive industry. Our findings imply adding external factors to the theory to ensure a more holistic and realistic consideration, arguing in line with Zott, Amit and Massa (2011) that a BM should depict a firm's business conduct on a systemic level. Even though according to Richardson (2008), a BM should solely be focused on firm-internal factors, our study showed that it is crucial to consider the external environment, especially if referring to an industry that is, for one, strongly linked to governmental interest, such as the automotive industry, and, for another, currently in a transition phase. The BM literature and future research should thus further consider the differences in BM designs regarding whether an industry is in a stable state or in a state of transition. Additionally, our study identified limitations towards the resource-based view by Barney (1991) incorporated in the BMC, illustrating that, in line with Christensen's (2011) argument, key resources can turn into a burden when competing for disruption.

6.2 Practical Implications

Besides the theoretical contribution, various managerial implications can be derived for German OEMs and Chinese EV companies. The different perspectives on an EV BM highlights the need to engage in dialogue with other market players and industry experts when designing an EV BM. Further, it became apparent that partnerships are crucial for both incumbents and new entrants in an EV system, as new resources need to be procured and industries independent from the automotive industry, such as energy companies, become essential partners. Further, a closer collaboration with the government becomes crucial to not face legislative surprises regarding the distribution of ICEs and EVs.

Furthermore, German OEMs need to be aware of the upcoming competition, not only from automotive but also technology companies. While they have acknowledged that a shift to a customer-centric approach is necessary, organizational conditions and path dependency restricts them from faster processes and drastic changes. Therefore, it is suggested to establish a sub-electric brand to accelerate EV development and engage in innovative BMs. This has already been applied by Volvo, who launched the EV brand Polestar. Further, Chinese EV companies intend to enter the market with highly digitized, software embedded EVs for a low price, which could disrupt the market and should not be disregarded lightly.

Moreover, Chinese EV companies acknowledge the lack of a dealer structure as a challenge, however, there are further obstacles involved with EVs that need to be considered. Most prominent are additional services and tools such as wall boxes, leasing and subscription options as well as seamless after-sales services. In this regard, German customers are used to the business structure of ICEs. Therefore, they hold certain expectations in terms of timelines and convenience, particularly in the premium car sector, that need to be addressed with appropriate offerings.

6.3 Limitations and Future Outlook

To conclude with this thesis, several limitations as well as an outlook, referring to possible further research, need to be addressed. A major limitation relates to the selective choice of highlighting

only the three most important building blocks derived from Osterwalder and Pigneur's (2010) BMC. Thus, future research should aim to analyze the different perspectives on all nine building blocks.

Furthermore, the scope of the findings, which were conducted with a small number of individuals in each category, limits the overall generalizability of the study. In addition, the findings are valid primarily for the German market. However, as the analytic generalization logic suggests, it may be applicable to other mature automotive markets with multiple OEMs. Therefore, future research could test these perspectives in other mature markets or focus on developing automotive markets, investigating if deviating perspectives can be identified there. In addition, only one group of new entrants (Chinese EV companies) has been interviewed. For future research, other competitors such as American EV companies or technology companies entering the market could provide further perspectives worth exploring.

Furthermore, limitations regarding the selection of interviewees need to be considered. Chinese study participants appeared more restrained in expressing their opinions in contrast to the German participants, which could be due to cultural traits or a limited knowledge of the German market. This goes hand in hand with the professional background of the participants. It became evident that the respective positions the industry participants occupy have a significant impact on their view, therefore, a more diverse background of participants would be beneficial to increase robustness and diversity for future research.

Lastly, this research has focused on EV BM and BMI from solely an OEM perspective. However, in the context of electromobility, future research should take a more holistic or systemic perspective, including suppliers, energy companies, and government authorities. In addition, since EV technology is still evolving, research should further investigate BMs after the transition period.

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Appendix A

Interview Questionnaire A - applied to categories I and II

Basic Information

1. Can you briefly introduce yourself with your full name, position, responsibilities, and tasks at your current employer?

Technology Shift

2. What challenges do you think hinder a wider adoption of EVs?
    a. How do you think OEMs are or can tackle these challenges?
3. Do you expect a complete transition from combustion engines to electric cars in the automotive market in ten years or do you expect them to exist simultaneously?
    a. Are there other technologies in the automotive/mobility market you anticipate becoming similarly relevant in the future? Please elaborate on your answer.

Business Model

4. Are you familiar with Osterwalder's Business Model Canvas? Please prioritize each of the nine building blocks of the business model (*Key Partners*, *Key Resources*, *Key Activities*, *Value Proposition*, *Customer Relationships*, *Customer Segments*, *Channels*, *Cost Structure*, *Revenue Streams*) from 1-9. Priority 1 means that you expect the greatest change in this building block regarding the transition from ICE to EV, priority 9 accordingly means the smallest change. Please explain your choices (especially your top 3 and bottom 3).
    a. Are there any additional building blocks you would think are missing in this model?
5. If you now put yourself 10 years into the future, would you change the priorities for the building blocks? Please elaborate on your answer.
6. Do you think that the OEMs are transforming from a product-oriented car manufacturer to a service-oriented mobility service provider (e.g., ride-sharing services, connectedness services)?
    a. What do you think are the biggest challenges involved in the transition?

7. Would you say German OEMs acknowledge this change in business model? And are doing enough to adapt their business model?
8. From a practitioner’s point of view, whose responsibility is business model innovation (i.e., process of changing/adapting/creating business models to suit old/new technologies)?
9. Where do you see advantages and disadvantages of new (Chinese) entrants' business model compared to incumbents?

Appendix B

Interview Questionnaire B - applied to category III

Basic Information

1. Can you briefly introduce yourself with your full name, position, responsibilities, and tasks at your current employer?

Technology Shift

2. What challenges do you think hinder a wider adoption of EVs?
    a. How do you think OEMs are or can tackle these challenges?
3. Do you expect a complete transition from combustion engines to electric cars in the automotive market in ten years or do you expect them to exist simultaneously?
    a. Are there other technologies in the automotive/mobility market you anticipate becoming similarly relevant in the future? Please elaborate on your answer.

Business Model

4. Are you familiar with Osterwalder's Business Model Canvas? Please prioritize each of the nine building blocks of the business model (*Key Partners*, *Key Resources*, *Key Activities*, *Value Proposition*, *Customer Relationships*, *Customer Segments*, *Channels*, *Cost Structure*, *Revenue Streams*) from 1-9. Priority 1 means that you expect the greatest change in this building block regarding the transition from ICE to EV, priority 9 accordingly means the smallest change. Please explain your choice (especially your top 3 and bottom 3).
    a. Are there any additional building blocks you would think are missing in this model?
5. If you now put yourself 10 years into the future, would you change the priorities for the building blocks? Please elaborate on your answer.
6. Do you think that the OEMs are transforming from a product-oriented car manufacturer to a service-oriented mobility service provider (e.g., ride-sharing services, connectedness services)?
    a. What do you think are the biggest challenges involved in the transition?

7. From a practitioner's point of view, whose responsibility is business model innovation (i.e., process of changing/adapting/creating business models to suit old/new technologies)?
8. Where do you see advantages and disadvantages of new entrants in the German market compared to incumbents?

Chinese Competition

9. In your understanding, what is/will be the role of Chinese EV companies/startups in the German automotive market? What impact could they have?
10. Where do you think Chinese EV companies are positioned/ would position themselves in the German automotive market?