CHALMERS
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Using a Servitized Business Model to Facilitate Adoption of Electric Vehicles for the Chinese Private Car Market

Master's Thesis in the Master's Programmes
Supply Chain Management & Management and Economics of Innovation

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Gothenburg, Sweden 2018
Report No. E 2018:071

MASTER'S THESIS E 2018:071

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Chalmers Reproservice
Gothenburg, Sweden 2018

Abstract

The automobile industry is facing a technological shift from internal combustion engines to battery driven electric vehicles, a shift called electrification. Since 2015, when it surpassed the U.S. market, the Chinese market has been the world's largest electric vehicle market. Electrification gives rise to a new set of consumer anxieties, primarily related to battery charging and range, but also price. In addition to the ongoing electrification, the automobile industry is also subject to a servitization trend, meaning that manufacturers are integrating a higher level of services in their offers. Further, innovative leasing and car pool related offers are rapidly emerging on the Chinese electric vehicle market. These trends suggest that car manufacturers need to develop new innovative business models to facilitate technology adoption and stay competitive.

This study investigates characteristics of servitized business models and how servitized business models can be used to overcome the obstacles concerning diffusion of electric vehicles on the Chinese market. The report's theoretical framework and findings are therefore structured based on the business model framework provided by Chesbrough and Rosenbloom (2002). Through interviews with researchers and industry representatives, and by studying market reports for the Chinese EV market, the study maps the components and attributes of a servitized business model from the perspective of the Chinese electric vehicle market. By doing this, it contributes to the theoretical field of servitization in B2C industries.

It is found that the Chinese electric vehicle market is rapidly growing, but consumer anxieties and preferences are continuously changing. The study concludes that several attributes of servitized business models, such as more agile development and closer customer relationships, could facilitate adoption of electric vehicles on the Chinese automobile market. Thus, to implement and benefit from a servitized business model, it is concluded that manufacturing companies must develop capabilities for gaining and acting on consumer insights. One way of doing this is by increasing the number of customer touch points, either physical or digital, throughout the usage life cycle.

Acknowledgements

This report was written during the spring semester of 2018 under the Department of Technology Management and Economics at Chalmers University of Technology.

First, we want to express our biggest gratitude to our supervisor at Chalmers, Anna Bergek, who have provided well needed guidance and support throughout the project. We would like to thank our contacts at Polestar, Nathan Forshaw and Ola Bernhardtz, who helped us define the project, provided assistance and made it possible get in contact with several interviewees. Further, we are grateful to everyone who took time to participate in our interviews during the project. Without the help of others, we would not have been able to finish our thesis.

Gothenburg, June 2018

Måns Löfås

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1 Background

Here, a short introduction to recent trends within the automotive industry is provided, followed by an elaboration on the concept of servitization. A research gap is identified to support the purpose and following research questions.

1.1 A Transforming Automotive Industry

The total number of cars sold globally has since the 1990s doubled, and in 2017 it reached approximately 80 million (Statista, 2018a). Much of the growth can be derived from the market growth in Asian markets. In China, the number of cars sold has more than tripled over the past ten years, reaching 22.1 million in 2017, accounting for 27.8 percent of the global industry (Statista, 2018b). Since 2009, when it surpassed the U.S. market, the Chinese automobile industry has been the world's largest (Ho, 2010). One of the main reasons for the market growth is, per EV Obsession (2018), because of efforts by domestic Chinese manufacturers.

Another trend in the global automobile industry is the emergence of electric vehicles (EVs), which has been evident during recent years (EV Obsession, 2018). In this context EVs are defined as vehicles driven by electricity and include hybrids as well as fully electric driven vehicles. From close to zero EVs in use in 2010, the number reached one million in 2015 and passed two million in 2016 (IEA, 2017). Despite the high growth rate in absolute numbers, EVs only account for 0.2 percent of the total passenger car/light truck market (IEA, 2017). Similarly, as with the case of the global automobile market, the Chinese EV market is the largest, after surpassing the U.S. sales in 2015 (IEA, 2017; Wang et al., 2017). The growth on the Chinese market is driven by domestic Chinese manufacturers, accounting for 96 percent of the market (EV Obsession, 2018).

The emergence of EVs has a distinct connection to global environmental issues. Several authors have researched the topic of sustainable development considering production, sales and recycling (Taghaboni-Dutta et al., 2010; Cao et al., 2013; Rostamzadeh et al., 2015). Already in the 1960s and the 1970s, EVs was a relevant topic due to identified impacts of air pollutions and rising oil prices (Dijk et al., 2013). However, at this point the relation between technological performance and price was inferior to that of the gasoline driven vehicles (Mom, 1997). In the 1990s the development of battery driven EVs was driven by a few small companies, which were producing cars in a small scale and selling them to a relatively high price (Dijk, et al., 2013). By 2009 most car manufacturers had developed battery driven EV prototypes. Many automakers started close collaborations with battery producers as battery technology was considered the key to improve EV performance (Dijk, et al., 2013). The present pace of the EV adoption is highly dependent on reducing the cost and improving the technological performance (Kumar and Revankar, 2017; Olson, 2018).

There are several types of actors impacting the development of EVs and the diffusion of them. Outside of the automotive manufacturers themselves, governments are major actors mainly supporting the development by regulations and subventions (Dijk, et al., 2013; Kumar and Revankar, 2017; Olson, 2018). Another influencer of the current commercialization of EVs are fleet operators who can profit from the low fuel prices and the fact that EVs cost less to operate and maintain than vehicles with internal combustion engines (Dijk et al., 2013). Mobility providers, such as car sharing organizations, are yet another actor shaping the field of transport

and the future of electric mobility. The low operating costs of EVs are one of the main reasons to why they are attractive to mobility operators (ibid).

Before 2015 the adoption rate of EVs on the Chinese market was low, despite large publicly financed incentives and subsidies (Wan et al., 2015). Skepticism towards new technologies, e.g. EVs, is generally found among consumers, as they have little experience and knowledge of said technologies (Gärling and Thøgersen, 2001). The skepticism is expressed in various consumer anxieties. Main identified anxieties on a global scale relate to lack of charging infrastructure (Sathaye and Kelley, 2013; Wan et al., 2015; IEA, 2017) and the generally higher purchasing price of EVs compared to combustion engine driven vehicles (Egbue and Long, 2012; Sathaye and Kelley, 2013; IEA, 2017).

Wang et al. (2017) suggest that the past two years' growth is a result of four factors: First, the monetary incentives were increased via public subsidies. Second, some larger Chinese cities, e.g. Beijing and Shanghai, initiated non-monetary policies to push EV adoption and decrease local pollution. Third, domestic firms greatly increased the number of models offered. Finally, business and distribution models were innovated, resulting in offers similar to leasing agreements and car pools. These four factors helped overcoming the main obstacles for EV adoption to some extent. The fourth factor facilitating adoption on the Chinese EV market identified by Wang et al. (2017) is also an evident trend on a global automotive industry scale (Gaiardelli et al., 2014). In fact, the phenomena of distributing products as services is a global trend found in several industries.

EVs are evidently a growing segment of the automobile market. As the world's largest market for EVs China is viewed as a leader in EV adoption. However, manufacturers are still facing several obstacles related to the technology itself and consumers' perception of it. Innovative business models are continuously developed as manufacturers are searching for ways to overcome aforementioned industry barriers and facilitate EV adoption. Servitization can be viewed as a recent trend amongst car manufacturers that provides new opportunities to create more user-oriented offers. This shift means that companies are selling functionality rather than pure products and open up for new types of customer relationships. Servitization can thus be considered a possible mean to overcome the obstacles that the Chinese EV industry is facing.

1.2 From Product to Service

The term servitization was first coined by Vandermerwe and Rada (1988) who described it as the bundling of services together with tangible goods. In this context servitization will be used to describe the shift from just offering products to the development of service-based value proposition. Two reasons for this transformation are competition between hardware manufacturers and the view of services as value adding activities (Sakao and Lindahl, 2009). Another point of view is brought forward by The National Board of Trade Sweden (2016) who identifies three trends in the economy driving servitization, namely: production and trade in value chains, the increasing share of services in the economy, and increasing competition in product markets. The shift towards servitization could also be described as a part of a strategy to create more value and long-term relationships with customers (Miroudot and Cadestin, 2017). In some cases, as with Rolls Royce concept 'Power-by-the-hour', where flight engine power is paid for by the hour, companies switch to selling usage instead of selling products (The Economist, 2009). This leads to a shift from customers owning physical products to just accessing product functionality (Sakao and Lindahl, 2009). Thus, there exists a product-service continuum where the share of services in the offer can differ (Baines et al., 2009).

The shift towards servitization is also evident in the automotive industry (Gaiardelli et al., 2014). Due to the low sales profitability of passenger cars, somewhere between zero and two percent, after sales services can lead to a significant increase in profits (Supplier Business, 2009). The transformation towards services is also important from a sustainability perspective as the shift towards selling mobility rather than a product leads to a higher utilization rate (Gaiardelli et al., 2014). Reducing the number of produced cars does not necessarily have to affect the profitability negatively but rather promote a change to new business models. Today there is a lot of focus on innovations in maintenance services as well as user-oriented and result-oriented services (Mahut et al., 2017). One example of user-oriented services is cars being equipped with entertainment systems, such as the Deezer music streaming service integrated in BMWs Connected Drive offer. Other examples are car sharing services or leasing agreements (Gaiardelli et al., 2014). Servitization has also been discussed as a potential important element in the context of the EV industry (Cherubini et al., 2015).

1.3 Academic Contribution

Two emerging trends have been identified in the automotive industry, electrification of vehicles and a shift towards service-based offers, servitization. Wang et al. (2017) identified innovative business models as one factor behind the growth of the Chinese market for EVs and several studies describe servitization as an emerging strategy amongst automotive manufacturers (Williams, 2007; Gaiardelli et al., 2014; Adrodegari, et al. 2015; Mahut et al., 2015: Mahut et al., 2017). However not as many studies focus on the specifics of the EV market, or the Chinese EV market in particular, and how its characteristics relate to service-based business models.

Some studies with relation to this one could be identified. What distinguishes these studies from other studies about servitization and relates them to this one is that they all treat the implications of services on the EV market:

Tongur and Engvall (2014) takes a business model perspective on technological shifts with a focus on truck manufacturers facing a switch to electronic road systems. The authors found that technology shifts are difficult to manage and that both service and technology innovations needs to be considered in order to create a viable business model.

One study, conducted by Cherubini et al. (2015), analyze the implications of Product-service systems (PSSs) on the critical success factors in marketing for the electric car industry. They found four subsystems for critical success factors: vehicle, infrastructure, on-board electronics, and energy. Finally, they argue the importance of partnerships amongst actors involved in the system.

Schmidt et al. (2016) studies the implications of PSSs on customers' acceptance of innovation using EV carpools as an example. Their findings show that using a PSS to provide an innovative product could help bridging the gaps between innovative and existing technologies. The example given by the authors is that anxieties related to EVs such as limited driving range and high purchase price could be mitigated if cars instead were offered as a service in a carpool renting agreement.

Naor et al. (2018) described how a servitized business model adapted from the telecommunications industry can be applied to overcome cost barriers in the e-car industry. The study concluded that a servitized business model can lead to better affordability and end-of-life

control of materials. However, it was also found that factors such as marketing and scale of investments needs to be considered when attempting cross-industry innovation.

All the examples above indicate that servitized offers can facilitate adoption of EVs. Tongur and Engvall (2014) shows that products and services are related and that technology shifts implicates service innovation. Cherubini et al., (2015), Schmidt et al. (2016), and Naor et al. (2018) all describe the implications of services on the EV industry. Cherubini et al., (2015) described the implications of servitization on success factors in marketing and Naor et al. (2018) even suggest a specific business model influenced by the telecommunications industry. However, none of the studies problematize the impact of servitization on the different components of an electric car manufacturer's business model and even less focus on any specifics of the Chinese market. This provides an opportunity to further study the characteristics of a servitized business model on the Chinese EV market.

1.4 Purpose

With the previously described background as a point of departure the purpose of this study is to study the characteristics of servitized business models and how they can be used by car manufacturers to facilitate adoption of EVs on the Chinese automobile market. The study strives to describe the different components of a servitized business model and identify opportunities as well as obstacles related to a servitized business model.

1.5 Research Questions

The problem analysis results in three central research questions which the study strives to answer:

- What are the characteristics of servitized business models and what elements are included?
- What are the main obstacles when implementing a servitized business model?
- How can a servitized business model facilitate EV adoption on the Chinese automobile market?

1.6 Delimitations

The study is primarily focusing on development of a business model but somewhat disregards the financial aspects. This is due to the fact that access to financial data is limited.

The study will touch upon aspects related to the impacts of digitalization on businesses, e.g. when covering full-service offers and integrated services. However, explicit theory on digitalization will not be covered. Instead, sufficient relevant theory on the topic will be integrated in theory on servitization and its impacts.

There exist several segments of EVs (e.g. solely battery-driven, hybrids, high performance) but, proposedly, no delimitations regarding this will be made. This is to provide a holistic view of the Chinese EV market that can be studied and used by several actors.

One way to explore the concept of servitization on the Chinese market would be to study already existing offers and their success. However, due to time limits and the need to be close to the market, i.e. travel to China, this is left outside of the scope of this study.

Finally, the technological trend towards autonomous vehicles, i.e. self-driving cars, is evident. However, as the technology is undeveloped and tested on a limited scale, the study will not bring forward potential implications of this. This is to avoid speculative reasonings and conclusions.

2 Problem Analysis and Theoretical Framework

The following part describes implications of technological transitions. It further conceptualizes companies' business strategies by describing the servitization of business models in the given context.

2.1 Technological Transitions

Technological shifts in industries are not only common but also often lead to changes in the competitive landscape. Incumbent industry actors are challenged when new technologies are developed and commercialized. Technological development can be described using the notion of a technology S-curve, illustrated in Figure 1. Initially, technology development is slow as researchers' and developers' knowledge level is low. Different approaches to the development are investigated and discarded until one approach is found suitable to continue to build upon. At this stage, technology development is high paced and often driven by new firms within the industry. However, all technologies have physical limitations they eventually reach. During the high paced development stage, these limitations become more evident and are often recognized when R&D returns are slowly diminishing. Ultimately, technology development is stagnating, and therefore the process of new technologies replacing old ones is continuous. (Foster, 1986)

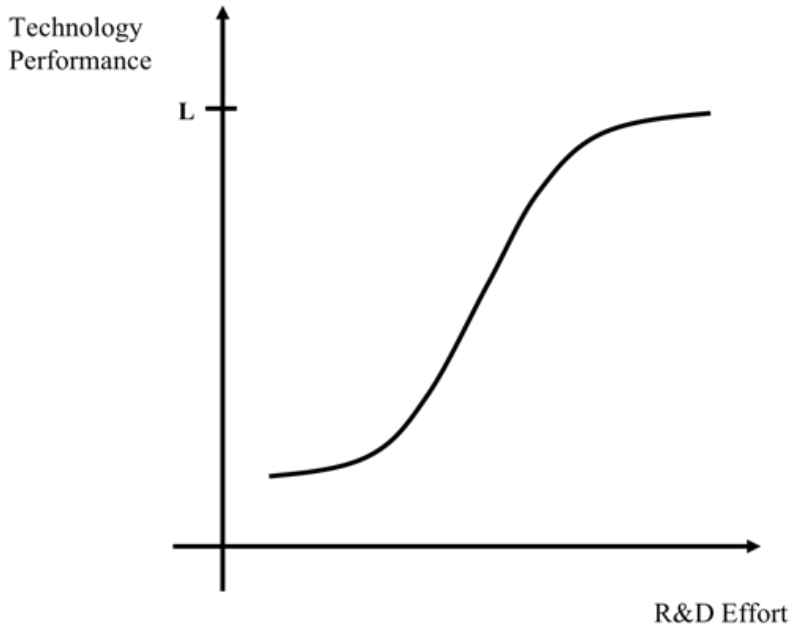

Figure 1. A technology S-curve. The performance increases with R&D effort until the physical limit (L) is reached.

The early and middle phases of the S-curve can also be explained using the term dominant design, which is used by several scholars, including Abernathy and Utterback (1978), Teece (1986), and Anderson and Tushman (1990). Similar to Foster's (1986) explanation, the dominant design emerges after a turbulent phase – the era of ferment – where the industry's actors are pushing different designs to continue developing. A battle versus both the old technology and different design within the new one is raging, leaving few resources for

technology development (Anderson and Tushman, 1990). Teece (1986) likens the battle as a game of musical chairs. Once settled, the industry can focus on evolutionary, or incremental, innovations and the pace of development increases (Abernathy and Utterback, 1978; Teece, 1986; Anderson and Tushman, 1990). Whereas Abernathy and Utterback (1978) do not specify which industries are characterized using the dominant design notion, Teece (1986) suggests that it is more suited to mass markets where consumer preferences are rather homogenous. Instead, he argues that small niche markets, less dependent on economies of scale and learning, are less affected by a dominant design.

A high development rate of an emerging technology may also affect the existing technology, increasing its performance to compete with the new one. This interplay was early identified by Gilfillan (1935), who noticed that the performance development of sailing ships accelerated as steamboats emerged. In terms of technology S-curves, introduction of a new technology will increase the steepness of the development slope of an existing technology. The phenomenon has later also been evident in several industries subject to technological shifts, e.g. locomotives and propellers (Cooper and Schendel, 1976). However, despite efforts to develop old technologies, the technology with the greatest potential will eventually take control of the market (Foster, 1986). This will lead to a competitive landscape where imitation is a common strategy and the impact of price competition grows (Teece, 1986).

While the S-curve can be seen as a useful framework at an aggregated industry level, its applicability at a company level is deemed ambiguous (Christensen, 1992). Few insights on how to develop technologies and handle technological shifts are provided. However, other scholars' work identifies factors relevant to successfully undergo an industrial technology transition as an incumbent firm. Teece (1986) and Tripsas (1997) identify a number of internal competences and capabilities and group them under the notion of specialized complementary assets.

Complementary assets are capabilities and/or assets not directly related to the technology which a company aims to commercialize (Teece, 1986). Independent of industry, some complementary assets, e.g. marketing, competitive manufacturing, distribution, and after-sale support, are usually considered to have a positive impact on commercialization of new technologies (Teece, 1986). Classification is further developed by introducing specialized complementary assets. Specialized complementary assets are complementary assets on which the new technology is unilaterally dependent (Teece, 1986). When studying the typewriter industry over a 104-year time span including three major technology shifts, Tripsas (1997) found that a key success factor for actors (both incumbent and new) in industries facing a radical technological shift was possession of specialized complementary assets.

The automobile industry is facing a technological shift. In 2005, governments worldwide, spurred by concerns about the climate change, put a demand on the car industry to decrease the vehicle CO_2 emissions and electric mobility emerged as a mean to reach environmental targets (Dijk, et al., 2013). By 2009 most car manufacturers had developed battery EV prototypes. Many automakers started close collaborations with battery producers as battery technology was considered the key to improve EV performance. However, the present pace of the EV adoption is highly dependent on reducing the cost and improving the technological performance of e.g. batteries (Kumar and Revankar, 2017; Olson, 2018). Servitization is seen as one possible strategy for companies to handle the technological transition towards battery driven vehicles (Williams, 2007; Gaiardelli et al., 2014; Tongur and Engvall, 2014; Adrodegari, et al. 2015;

Cherubini et al., 2015; Mahut et al., 2015; Schmidt et al., 2016; Mahut et al., 2017; Naor et al., 2018).

2.2 Servitization of Industry

Servitization is driven by customer demand (Vandermerwe and Rada, 1988). Post purchase services that previously were seen as necessary costs to ensure sales has become more and more crucial in creating competitiveness (Gadiesh and Gilbert, 1998; Wise and Baumgarter, 1999). This becomes even more important to firms whose product sales growth is restricted by elongated product lifecycles and a saturated market. Because of such reasons the strategic focus shifts towards leveraging value from an already installed base of products. Baines et al. (2009) gives examples of similar strategic drivers and also mentions financial drivers, such as revenue streams and profit margin, and marketing drivers, such as customer relationships and product differentiation, as reasons for the frequent occurrence of servitization. Bustinza et al. (2015) argue that servitization creates differentiation opportunities in growing markets. A shift towards services is enabled by technical innovations of information and communication technologies which allow manufacturers to better track the state and location of products (Baines and Lightfoot, 2013) and offer services based on real time data (Cherubini et al., 2015).

As argued by Gaiardelli et al. (2014) the automobile industry is also impacted by the shift towards servitization. Ownership as described in a traditional car selling business model is being increasingly challenged by new types of mobility solutions (Williams, 2007; Adrodegari, et al. 2015). New offers such as renting and leasing (Fink and Reiners, 2006; Piscicelli, et al., 2014), and different types of car-sharing services (Liu et al., 2014; Andriankaja et al., 2015; Tran et al., 2015) are emerging on the market. Providing services is a way for manufacturers to remove their customers' issues of irregular maintenance costs and costs for perishable parts by instead selling availability (Mahut et al., 2015). Studies on car-sharing systems (Lim et al., 2012) show that car ownership is sometimes seen as a negative and that only the availability of car mobility is desired (Mahut et al., 2015). A shift is therefore seen where parts of the automotive market goes from product-oriented to use-oriented and result-oriented. Kley et al. (2011) suggest that one of the important elements of the electric car industry are services that increase the use of cars in the transport network. Cherubini et al. (2015) also describe the dominant role of services in the electric car industry. They highlight the role of intangible components, such as services, when creating innovative automotive solutions. With this background it is further argued that the adoption of electric vehicles will only increase if a PSS approach is taken (Cherubini and Iasevoli, 2012).

Integration of products and services has led to the emergence of many types of concepts, one of those being PSSs (Goedkoop et al., 1999; Sakao and Lindahl, 2009; Mahut et al., 2017) which in several cases are talked about in relation to the automotive industry (Goedkoop et al., 1999; Cherubini et al., 2015; Schmidt et al., 2016; Mahut et al., 2017). PSSs are based on the notion of integrating the product and the related services already in the planning phase (Müller et al., 2009), thus distinguishing PSSs from Vandermerwe and Rada's (1988) definition of servitization where bundling of products services are not necessarily done in an early stage and therefore with less synergy. This means that one benefit of a PSS is that the performance of both the product and the service is enhanced by the exchange between them. Mahut et al. (2017) found that a PSS is a system of tangible and intangible assets that creates synergies through an integrated design. The concept of PSS is driven by mass customization trends, flexibility, and markets driven by quality and value added rather than cost (Mont, 2002). It also makes core competences more important in relation to physical assets.

There is a relation between PSSs and the company strategy (Mahut et al., 2017), and a PSS needs to be accompanied by a suitable business model promoting long term commitments within the stakeholder network (Müller et al., 2009). However, this leads to struggles for companies who are unable to successfully design and implement PSS business models (Reim et al., 2015). Baines and Lightfoot (2013) refer to a PSS as a 'value in use' business model as responsibilities, such as equipment performance, are shifted towards the manufacturer who gets paid when the product is used by the consumer. Examples of pay for use concepts in the automotive industry are car sharing services (Liu et al., 2014; Andriankaja et al., 2015; Tran et al., 2015) and renting and leasing agreements (Fink and Reiners, 2006; Piscicelli et al., 2014).

As seen in previous studies (Müller et al., 2009; Baines and Lightfoot, 2013; Gaiardelli et al., 2014; Reim et al., 2015; Mahut et al., 2017) integration of services has implications on a company's strategy and business model. The next chapter thus strive to conceptualize a service-based business model and describe its components and their relation.

2.3 A Business Model Conceptualization

A company's long-term performance can be described using two core concepts: corporate strategy and business strategy (Grant, 2010). A company's corporate strategy addresses the question where a company competes, e.g. in terms of industry and geographic location, while its business strategy addresses how the company competes (Grant, 2010). In the transforming automotive industry previously described, incumbent and emerging companies' business strategies are important to ensure successful performance and growth. When shaping the strategy, it is therefore important to understand the nature of technological shifts and how they affect the market context.

A company's business model is an important piece of their business strategy, describing how to create and deliver value to customers (Chesbrough and Rosenbloom, 2002; Osterwalder and Pigneur, 2010; Ritter and Lettl, 2018). Different authors have different views on what is included in a business model. Chesbrough and Rosenbloom (2002) argue that a business model can be seen as a mediator between technical inputs and economic outputs. Their model includes six components: the value proposition (i.e. the value created for the users), the market (i.e. the targeted users and the revenue generation mechanisms), the value chain (i.e. the chain of activities necessary to create and distribute the offer), the value network (i.e. the position in the supply network), the cost structure and profit potential, and the competitive strategy (i.e. how to create advantages over competitors). By formulating these functions, a technology can be commercialized in such a way that it creates value to the customers (Chesbrough and Rosenbloom, 2002).

Magretta (2002) argues that a good business model answers the questions: *Who is the customer? What does the customer value? How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?* Morris et al. (2005) synthesize several studies on business models and ends up with six main components underlying the business model: factors related to the offer, market factors, internal capability factors, competitive strategy factors, economic factors, and personal/investor factors. Osterwalder and Pigneur's (2010) model, on the other hand, consists of nine building blocks: customer segments, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structures.

Clearly, suggested components differ in names and numbers but the common theme is similar. In the case of the technological paradigm shift the automotive industry is facing, Chesbrough and Rosenbloom's (2002) model is deemed most relevant, as it explicitly provides insights on how a technology can be commercialized. Furthermore, their model has been applied to describe a service-oriented manufacturing company (Xerox) and some of its spin-offs (e.g. Adobe and Metaphor), which is found suiting as the purpose of the study aims to describe how servitization can be appropriated on the Chinese EV market. Hereafter follows a conceptualization of Chesbrough and Rosenbloom's (2002) business model (see Figure 2) and an exposition of the implications resulting from servitization of business models which is summarized in Table 1 at the end of this chapter.

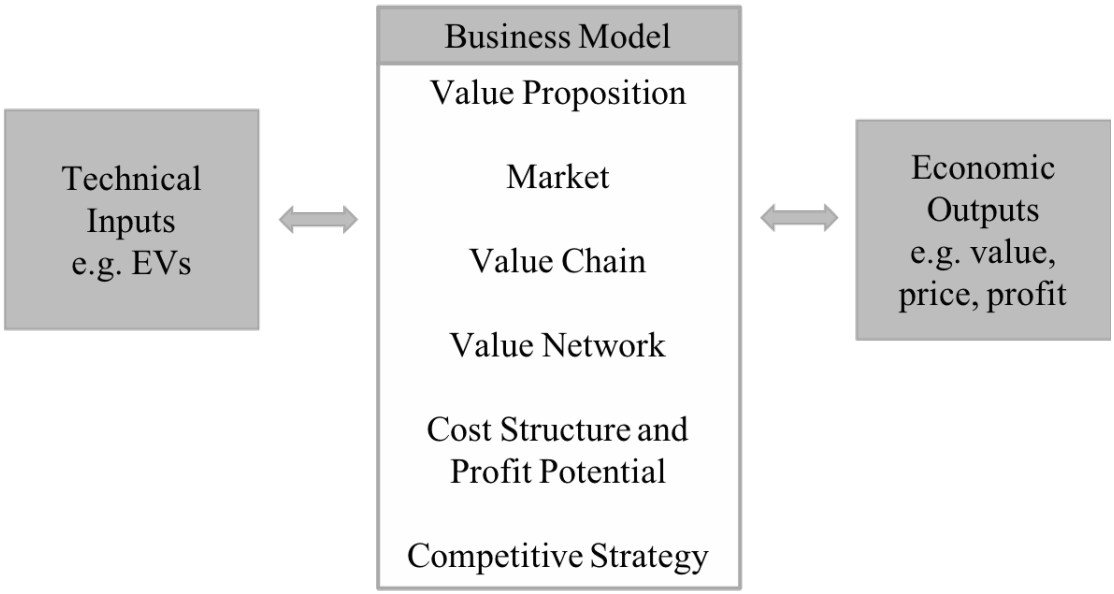

Figure 2. A conceptualization of a servitized business model based on the definition by Chesbrough and Rosenbloom (2002).

2.3.1 Value Proposition

One of the main challenges for businesses today, especially in a global environment and with advanced technology, is to connect with the customers (Barnes et al., 2017). Specifying the value proposition means deciding on what to include in the offer and how customers may use it (Chesbrough and Rosenbloom, 2002). The value proposition describes the benefits customers gain from a company's products or services (Chesbrough and Rosenbloom, 2002; Osterwalder et al., 2014) and is supposed to solve the customers' problems (Reinartz and Ulaga, 2008). A value proposition should permeate the entire company and turn the focus towards the customers' main issues that need to be resolved (Barnes et al., 2017). As indicated by several studies made on business models the value proposition is a vital part of the business model (Chesbrough and Rosenbloom, 2002; Morris et al., 2005; Osterwalder and Pigneur, 2010). Thus, deciding what to include in the value proposition will be one major issue for companies striving to excel on a new market.

As identified in the background, servitization means that value is created towards customers by expanding a product with a service or, as in some cases, fully exchange the product offer for a service offer. This opens up for companies to create and deliver value in a whole new way. According to various authors, the value proposition is one of the main elements of the product-service business model (Schuh et al., 2008; Kindström, 2010). It represents the bundle of

products and services offered and the benefits driving customers willingness to pay. In the servitization process the characteristics of the value proposition shifts as product effectiveness to handle certain customer processes replaces product functionality and efficiency, and long-term transactions and relational agreements replace short-term transactions (Stremersch et al., 2001; Oliva and Kallenberg, 2003). Within the academic field of servitization, several scholars touch upon similar points and describes the benefits of a servitized value proposition from a customer experience perspective. For example, servitization can be used as a mean to create customer loyalty since the dependency rate between selling company and customer is higher in a servitized value proposition (Vandermerwe and Rada, 1988). Matthyssens and Vandenbempt (2008) suggest that the value proposition can be based on differentiation in either product leadership, customer intimacy, or operational excellence.

Services are fuzzy and more difficult to design than products (Slack, 2005). Sampson and Froehle's (2006) Unified Service Theory suggests that it is ultimately the presence of customer input that distinguishes a service process from a non-service process. When it comes to product related services Baines and Lightfoot (2013) divides them into base services, intermediate services, and advanced services. Base services are of a low level and can include product provision, spare part provision, and warranty. Intermediate services are focused on maintenance and product condition and include services such as scheduled maintenance, repair, help desk, installation, and operator training. Lastly, the advanced services are focused on the capability delivered through the performance of the product and can include revenue-through-use contracts, customer support agreements, rental agreements, and risk and reward sharing contracts. Advanced services tend to feature extended life-cycles, increased manufacturer responsibility, and regular revenue payments. The process of servitization means a move towards an integration of advanced services (Baines and Lightfoot, 2013).

Several examples are given for how service-based value propositions are formed. In the context of servitization it is important to consider a life-cycle perspective (Rabetino et al., 2015) and adjust product-based services to customers' operational activities during the product life cycle (Raddats, 2011). A distinction can be made between services that support products and services that support customers' processes (Oliva and Kallenberg, 2003, Antioco et al., 2008; Gaiardelli et al., 2014; Rabetino et al., 2015). Gaiardelli et al. (2014) argues that a product-service offer could be described as either product-oriented, user-oriented, or result-oriented.

Within the automobile industry, services can be categorized into technical and non-technical services (Juehling et al., 2010). It is also possible to separate pre-sales, sales, and after sales activities. During the stage where the car is used several types of services are facilitated and the emergence of the Internet of Things and Big Data enables integration of functionalities such as assisted driving, embedded communication services, personalization, and dematerialized car keys (Juehling et al., 2010).

2.3.2 Market

Deciding on the target market means to specify the segment of customers that will use a product (Chesbrough and Rosenbloom, 2002). Different customers will view the attributes of a product in different ways, therefore the choice of market has major implications when shaping an offer. In the market category, Chesbrough and Rosenbloom (2002) also include the possible architecture of revenues, i.e. how customers should pay, how much, and how to apportion the value between actors. As depicted in the background, the market for EVs in China has been growing during the past two years (Wang et al., 2017) creating a new environment for

automobile manufacturers. Companies intending to enter this market thus have to create an understanding for this segment of the automobile market, what customers value and the revenue generation mechanisms. The Chinese EV market is facing several obstacles such as price (Sathaye and Kelly, 2013; Wan et al., 2015; IEA, 2017) and technology anxieties (Egbue and Long, 2012; Sathaye and Kelly, 2013; IEA, 2017). Customer characteristics such as these and many others thus need to be investigated in order for a company to properly adjust their business model to the targeted market.

Knowing the customer is vital when developing a value proposition (Barnes et al., 2017). Three types of customers are described by Baines and Lightfoot (2014), namely: the 'do it themselves type', the 'do it with them type', and the 'do it for them type'. The last category of customers requires advanced services and pay for the use of the products and its capabilities. Several companies overestimate their perceived customer experience (Frow and Payne, 2007). Carefully investigating various customer segments' service experiences will help mitigating the issues and identify opportunities for improvement. Another element in creating a good customer experience is understanding the economies of customer segments. As different customer segments vary in profitability, it might be necessary to leave certain segments as it is not financially feasible to pursue a perfect customer experience there. Schmidt et al. (2015) explains that the granularity of a customer group has to be decided to indicate whether focus lies on an entire industry, an individual customer, or on some other level of detail. The authors also describe customer barriers which can be described as barriers for consumption that are connected to the focused customer group. Eight categories of barriers are identified: complexity, costs, reliability and availability, interoperability, irrationalities, trust, unawareness of need, and values and beliefs. To create customer acceptance, barriers need to be identified and strategies to overcome them need to be defined (ibid). There are several obstacles related to the adoption of EVs (Egbue and Long, 2012; Sathaye and Kelly, 2013; Wan et al., 2015; IEA, 2017) raising the question of how to diffuse this emerging technology.

Rogers (2003) presents a theory where diffusion of innovations follows a normal distribution pattern (commonly referred to as a "bell curve"), see Figure 3. It is based on five types of adopters and their behaviors: *innovators*, *early adopters*, *early majority*, *late majority*, and *laggards*.

The innovators are the first 2.5 percent (of the total number of adopters) to adopt an innovation. These are adventurous risk-takers who are eager to try new ideas and solutions. Since they are the first ones to adopt new technologies, they need to be able to handle the uncertainty connected to new technologies, that could also prove costly to them. Therefore, innovators generally also have significant financial resources. The innovators serve as gatekeepers for new technologies and without them, no one would follow.

The following adopter segment contains the early adopters. They account for 13.5 percent of all users and are more similar to average people than the innovators in terms of personality traits and resources. The early adopters are generally also respected and thought to have good judgement within their social system. Therefore, their main role in the diffusion process is being opinion leaders, reducing various uncertainties and providing evaluations of the innovation to others. This is generally done via word-of-mouth. Additionally, being respected individuals, Leonard-Barton (1985) suggests it is sometimes enough for opinion leaders to own and use the product, making it visible for other potential adopters, to speed up the diffusion process. However, the importance of opinion leaders may have decreased in the age of social media. It

is found that the early adopters should consist of "normal" people rather than opinion leaders to create broad coverage on the internet and finally an internet trend (Zhang et al., 2015).

The majority of adopters are divided into the early majority and the late majority, each accounting for 34 percent of total adopters. Being the two largest groups of adopters, they are made up of many different people. However, generally these consumers are hesitant to adopt innovations and are thus less likely to be interested in new technologies services. Finally, the last 16 percent to adopt an innovation are called laggards.

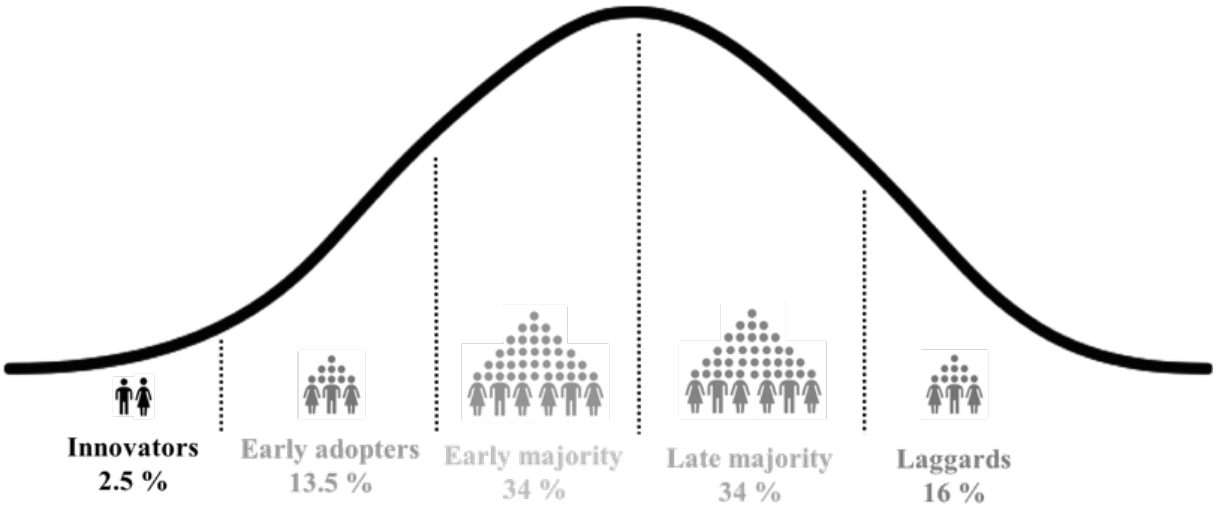

Figure 3. The five different types of innovation adopters identified by Rogers (2003).

The challenge for companies is to enable diffusion of their innovations. While Roger's (2003) bell curve often is visualized as continuous, Moore (2014) argues that there are cracks between the different adoption groups. The largest, referred to as "The Chasm", is located between the early adopters and the early majority, i.e. the largest obstacle for a company's innovation is reaching a mainstream market. Moore (2014) suggests the key is targeting a niche market. The goal is to become a market leader of an attractive niche sub segment.

While innovators and early adopters are open to new technologies, the early (and late) majority is not. One of the reasons for their long decision-making time is that they want to evaluate several options before making a decision, i.e. mainstream customers are prone to compare before buying and therefore competition is necessary. Thus, Moore's (2014) strategy involves identifying and positioning in a subset of a mainstream market where the company's offer is the obvious choice.

2.3.3 Value Chain

The value chain of a company is the set of activities needed to create and distribute the value of a product or service (Porter, 1985). However, knowing how value is created and distributed is not sufficient for a company to make profit, the company must also understand how to appropriate said value (Chesbrough and Rosenbloom, 2002). Teece (1986) suggests one way of doing this is by using complementary assets, i.e. assets not per se directly related to the technological innovation itself, e.g. manufacturing capabilities and marketing channels. Thus, defining and understanding the value chain is not enough to successfully commercialize technologies, identification of complementary assets is also important to fully understand the context and opportunities. Turning to service-based offers will force companies to reevaluate which assets and competencies are required to support the new business model (Chesbrough

and Rosenbloom, 2002). Providing more innovative services demands a new type of value chain (Mahut et al., 2017).

Oliva and Kallenberg (2003) describes a process theory for how companies transition from being a product manufacturer to a service provider based on a number of stages. The first stage is consolidation of services and includes moving all service activities under the same roof, introduce monitoring activities, studying efficiency and effectiveness of the service delivery, and add services to support quality initiatives. Second, companies need to enter the installed base service market, leading to actions such as defining said market, creating a separate organization for marketing and delivery of services, and creating an infrastructure to handle local service demands. The third stage includes expanding to relationship-based and process-centered services. This includes overtaking the operating risk, developing a consulting capability, creating a new distribution network, and expand to include other manufacturers (ibid).

Several internal capabilities are required in order to capture value and provide the perfect customer experience (Frow and Payne, 2007). Companies need to know how to utilize mapping tools to improve the customer experience. The customer experience is a result of the value chain and therefore a mapping of the perfect customer experience can help identifying improvement opportunities on how to deliver it. Several tools for doing this are available, including service-blueprints, customer activity cycles, and customer-firm touch point analysis. Introducing appropriate metrics for measurement of customer experience is another measure. To understand customer experience, it is necessary to measure it. This is hard and traditional ways of measuring it often fail to identify deep customer needs. Delivering a perfect customer experience is also dependent on profound understanding of customer needs, thus companies have to recognize the need for cross-functional integration. This can only be achieved when the organization's different departments collaborate and share information in a cross-functional manner. Independent of which communication channel is used, the brand must be perceived the same way by the customer. Messages can be based on either rational or emotional perspectives. What is important is consistency and coherency throughout all communication channels so that the company achieves brand consistency. The journey towards a perfect customer experience can help motivate employees' motivation and work satisfaction. Therefore, it is important to involve the whole organization in the mapping of the perfect customer experience. Furthermore, this will also increase understanding of what the aim is and therefore increase work performance among employees (ibid).

2.3.4 Value Network

The value network is the environment of actors in which a company operates to successfully realize their business model and capture the generated value (Chesbrough and Rosenbloom, 2002). The environment consists of suppliers, customers, competitors, and other various third parties. Being positioned strategically in the value network can leverage the commercialization of a technology, e.g. by increasing network effects among consumers (Chesbrough and Rosenbloom, 2002). Mapping the value network and investigating the relations within it is therefore necessary.

Some insights concerning the Chinese EV market and potential implications on the value network are provided in the background. Wang et al. (2017) suggest that public subsidies play a significant role in EV adoption, and many consumers feel anxieties regarding the lack of charging infrastructure (Sathaye and Kelly, 2013; Wan et al., 2015; IEA, 2017). Further, a

mapping of EV companies and their offers is necessary to fully understand how an actor can position themselves to successfully compete. Classification based on the intensity of relationships has been done by several researchers (Oliva and Kallenberg, 2003; Nordin, 2004; Ulaga and Reinartz, 2011) and includes the involvement, commitment and trust between the actors (Rabetino et al., 2015). Servitization leads to closer, long-term, relationships with customers (Miroudot and Cadestin, 2017). Emerging service offers, such as the integration of Deezer music streaming service integrated in BMWs (Mahut et al., 2017), indicates that car manufacturers need to engage in new types of partnerships. The role of customer relationships and partnerships will thus be further described in the sections below.

2.3.4.1 Customer Relationships

Customer relationship management is a concept originating from the late 1990s (Payne and Frow, 2004) which to a large extent derives from principles of relationship marketing (Berry, 1983) and involves building relationships of mutual value between suppliers and customers (Grönroos, 1996). The relationship between the system provider and the customer is of high importance for maintenance, repair, and remanufacturing processes (Sundin, 2009). To fully understand customer needs and preferences, a company can analyze a customer-activity chain. A customer-activity chain maps the activities a customer needs to engage in to reach a desired result (Sawhney et al., 2004). The chain often contains interaction with different actors from different industries, which differs depending on which customer is analyzed, and can provide insights on possible services to be added to a company's service offers (Sawhney et al., 2004). Related to these customer activities are customer touch points, which are instances where there is direct contact between the selling company and the customer (Meyer and Schwager, 2007). Customer touch points can be both physical and digital meetings (Sampson and Froehle, 2006). Depending on the given context, customers' opinions on length and information exchange during the touch points differ (Meyer and Schwager, 2007). When the core offer is a service, the interactions generally matter more than when it is a product (Meyer and Schwager, 2007). Monitoring the customer experience during the touch points, e.g. using surveys and observational studies, can help identifying gaps between customer expectations and experience, thus providing opportunities to add offers and improve the customer experience (Meyer and Schwager, 2007).

One factor in the relationship between a supplier and a customer is the 'product ownership' which simply refers to whether it is the manufacturer or the consumer who owns the product (Rabetino et al. 2015), e.g. if it is a product-oriented service or a use-oriented service (Sakao et al., 2009). The nature of the interaction between the customer and the product-service provider can also be described as either transaction-based or relationship-based (Gaiardelli et al., 2014). This relates to the intensity of the relationship where transaction-based relationships mean that supplier and customer only make one-time deals while relationship-based relationships imply long time cooperative agreements between supplier and customer. Since customer inputs generally come in great numbers and are heterogeneous, it is especially important to assess the financial implications of integrating the different customer inputs for companies pursuing a cost leadership strategy. How and when to accept the inputs are important questions. Companies using a focus strategy do this, as they focus their customer input integration on the needs of a narrow and well-defined customer segment. Inputs from customers with similar expectations are used to design the service offer (Sampson and Froehle, 2006).

Out of 11 activities defined by Frow and Payne (2007) to improve the customer experience four of them relate to the relationship to the supplier and the customer:

Identifying opportunities for co-creation: There exist possibilities for selling companies and customers to cooperate and create value and an increased customer experience. It requires communication between the selling company and customer, and sometimes also instructions on how to create the best experience. As an example, the authors mention a beer brewery that attached instructions on how to serve the 'perfect pint' (e.g. in terms of temperature and pouring angle). Many companies fail to take advantage these value co-creation opportunities.

Carefully managing customer touch points: Each customer touch point, once identified, must be managed individually to improve the customer experience. Solutions are dependent on what type of product/service is offered, what type of touch point it is, and who the customer is.

Ensuring a consistent customer experience within and across multiple channels: Generally, there are different channels that can be used by the customer to engage with the offered product/service. These should be managed to ensure consistency in the customer experience, independent of which channel is used. Further, a multi-channel strategy increases the probability of meeting the customers' channel preferences.

Determining how customer preferences differ across the relationship lifecycle: As customer behaviors and needs differ during the relationship lifecycle, it is important to adapt the customer experience to the cycle. The importance of consistency and special assistance during the early phases of the lifecycle is highlighted. This is deemed critical in the process of turning new customers into loyal customers. Further, it is argued that services should be offered early in the customer's decision process (Vandermerwe and Rada, 1988). In fact, Sampson and Froehle (2006) argue that presence of customer inputs is necessary when defining a service process.

2.3.4.2 Partners

To facilitate their service offers, companies often search for partnerships or alliances within their value network (Vandermerwe and Rada, 1988). The concept of business networks is common and extensively researched. It describes a business environment as a number of business interactions directly or indirectly influencing a focal actor or a focal relationship (Ford et al., 2003). Furthermore, a business network perspective addresses connecting points and interdependence between several actors in a business environment (Henneberg et al., 2013). Powell (1990) describes a network structured organization as an organization that leverages on complementary strengths between itself and its partners, rather than vertically integrating its supply chain or benefiting from the cost competition on open markets. Several arguments for network structured organizations are brought forward, the most prominent being access to others' know-how and the demand for speed (Powell, 1990). Collaborating with other companies, especially from other industries, provides access to years of experience, education, and training. It is generally less costly and time consuming to partner up with another actor than developing the technology and know-how in-house (Powell, 1990). External partnerships are especially beneficial for small and medium sized companies, as their internal resources generally lack large internal resources (Teece, 1986). Furthermore, Porter and Fuller (1986) argue that partnerships are more successful than mergers when quick response to changes in the market environment is intended.

When a company is aiming to differentiate themselves, advanced services should be developed either by a specialist service unit or external partners (Bustinza et al., 2015). Many services depend on several service providers before they are offered to the customers (Henneberg et al., 2013). One example is an airline flight, which depends on e.g. an airline, security staff, refueling staff, baggage handlers, and traffic controllers (Rust and Chung, 2006). Partnership ties can be

categorized as either strong or weak (Granovetter, 1973). Strong ties are fewer in number and demand more care than weak ties and the participants tend to share information and views. Practically, it comes down to a difference in interaction frequency when distinguishing between strong and weak ties partnerships (Larson, 1992). One large drawback of strong tie partnerships is that companies risk being locked in and may therefore miss out on business opportunities with other actors (Capaldo, 2007). It is suggested that a company has a core of a few strong ties and a large number of weak ties in order to reach continuous success (Capaldo, 2007).

Independent of whether the partnership ties are strong or weak, there exists one significant risk of engaging in a service partnership. Henneberg et al. (2013) presents the following example: Consider the airline flight again and picture a situation where a passenger's luggage is severely damaged. The passenger may blame the airline company, despite the mistake being committed by the company handling the luggage. A study by Tax et al. (2011) suggests that members within service network need to respond to service failures caused by others as well. This can be done either by solving the problem by themselves or work together with the partner(s) committing the mistake. To find a quick solution, communication and coordination among the service network partners is needed (Tax et al., 2011).

2.3.5 Cost Structure and Profit Potential

The profit potential of a company is basically determined by a company's costs and revenues. Depending on how the value chain is structured, the cost structure of delivering the value proposition will differ (Chesbrough and Rosenbloom, 2002). Similarly, offering the value proposition to a specific market segment will provide insights on how the revenues will be structured (Chesbrough and Rosenbloom, 2002). Offering an EV as a service implies a different revenue architecture than a one-off sales model. Further, there are several different pricing strategies also affecting the revenues in different ways (Ritter and Lettl, 2018). For example, companies may skim the market (charging the highest price the segment is willing to pay and gradually lower prices), offer low prices to gain market shares quickly, or use "razor and blade" strategies (selling the core product/service cheaply while offering expensive complements).

By incorporating services that transfer responsibilities from the customer to the provider, their risk level increase (Gaiardelli et al., 2014). In some cases, the manufacturer even takes full responsibility for the end user's processes (Oliva and Kallenberg, 2003). This means that the price needs to include that extra risk (Sawhney, 2006). When offering products and services together it is also important for manufacturers to be able to develop price strategies that takes both products and services into consideration and at the same time lower the total cost of ownership (TCO) for the consumer (Cherubini et al., 2015). Juehling et al. (2010) argue that, due to the batteries and their relatively short life span, EV and hybrid car consumers experience a high TCO. By offering the availability of batteries customers no longer have to manage risk and depreciation of batteries.

2.3.6 Competitive Strategy

A competitive strategy positions a company on the market and explains how they create a competitive advantage over other actors (Chesbrough and Rosenbloom, 2002; Morris et al., 2005). This facilitates decision making and gives an internal signal for how resources should be utilized (Chesbrough and Rosenbloom, 2002). Companies can position themselves based on different factors such as operational performance, product performance, innovation, cost versus efficiency, or through the customer relationship experience (Morris et al., 2005). Since the Chinese EV market is characterized by new innovative business and distribution models (Wang

et al., 2017) it seems necessary for new entrants to create a competitive strategy. Shifting to servitization is one way of creating a competitive edge. This strategy leads to companies having long-term customer relationships (Miroudot and Cadestin, 2017) thus improving the customer experience.

Three rationales for integrating services are the economic element, the customer demand element, and the competitive element (Oliva and Kallenberg, 2003). The economic aspects come from the ability to use services to generate income from an already installed base (Potts, 1988), the fact that services have higher margins (Anderson et al., 1997; The Economist, 2000), and a higher resistance to economic circles due to a lower need for investments and equipment purchases (Quinn, 1992). Other drivers for servitization are increasing customer demand for services (Oliva and Kallenberg, 2003), and increased competitive advantage through differentiation (Heskett et al., 1997) and customization (Vandermerwe and Rada, 1988). Companies pursuing a differentiation strategy must handle customer inputs differently than its competitors to enable the creation of a different value proposition. This strategy is thus deemed harder for a service company than a manufacturing company, as it is easier to keep secrets within a factory than in a service offer visible to others (Sampson and Froehle, 2006).

Opportunities related to implementation of PSSs include reduction of energy consumption and circular economies (Tukker and Tischner 2006; Lindahl et al., 2014), improved customer satisfaction through services (Aurich et al., 2010), and improved reliability and maintenance operations through better information flows (Mahut et al., 2017). For companies, benefits from implementation of PSSs are connected to differentiation from competitors (Pezzotta et al., 2014), improved profitability (Juehling et al., 2010), and improved innovation processes (Mont, 2002). For manufacturing companies in particular the possibility to extend offers with services, improved customer relationships, and better reaction to future take-back legislations are some noticeable upsides of PSS. Consumers also gain from PSS as they get the access to more diversified offers on the market, a higher level of customization, and need to take less responsibility for the product as it stays under the ownership of the producer (Mont, 2002). Studies also show that PSSs could have positive implications for balancing social, financial and environmental targets (Mont, 2002; Sundin and Bras 2005). A system-based view facilitates the fusion of production and consumption into a system in which products, services, the supporting infrastructure, and networks are designed in such a way that consumers are satisfied at the same time as the environmental impact is minimized (Mont, 2002).

Vandermerwe and Rada (1988) suggest that servitization is one way of achieving this. Several arguments and examples are brought forward, including the closer relationships with customers that is implied by servitization, and the larger possibility of customer customized solutions (Vandermerwe and Rada, 1988). Especially on growing markets, servitization can work as a tool of differentiation as service providers generally gain larger insights on customers' experiences and needs (Bustinza et al., 2015). Furthermore, services are intangible and difficult to imitate, enabling a sustaining competitive advantage (Heskett et al., 1997).

2.3.7 A Servitized Business Model

Previous sub-chapters describe the characteristics of a servitized business model and how it can be used to commercialize new technologies. Characteristics of servitized offers can be connected to the different components of the business model showing the impact of service integration. The characteristics are hereafter described and summarized in Table 1.

The value proposition describes how a certain offer creates customer value by solving a certain problem. In a servitized offer, the focus is shifted towards the customers' processes (Stremersch, 2001; Oliva and Kallenberg, 2003). It thus becomes increasingly important to identify the consumers' main issues related to these processes and then develop a way to handle these processes. In this case, the technology can then be used as an enabler to create services that solves these problems. Furthermore, companies need to decide on the level of service integration, i.e. how much of the focus should be on services in relation to the product. As the market component is described as the segment of customers that will use the content of an offer a company's actions related to it is not as highly impacted by the service integration. However, new types of offers indicate new segments of interest which means that a company choosing to servitize needs to redefine their customers and gain insights on their anxieties and preferences. When commercializing a technology, it is also important to identify the barriers related to each market segment and find ways to overcome them. One way of doing this is to identify innovators and early adopters.

It is also seen that the value chain component will change when services are integrated to a higher level. For an example, servitizing companies need to develop new competencies for service marketing and delivery (Oliva and Kallenberg, 2003). Manufacturers also need to be able to handle their customers processes and develop capabilities and tools to improve the customer experience related to the interaction with the company. For example, companies can develop tools to identify customer behavior (Frow and Payne, 2007). When it comes to the value network, the relation to customers and partners are described by literature as highly impacted by servitization. In regard to the customers this is an effect of the intensified relationships related to servitization which requires more communication and additional customer touch points. It also requires the manufacturer and the customer to define the ownership structure of the included product. Integration of services further imply new types of partnerships with actors specialized on service delivery (Bustinza et al., 2015). These partnerships do, however, imply risks related to mistakes made by partners and who has to answer for them (Tax et al., 2011; Henneberg et al., 2013).

For the cost structure and profit potential component the main identified impacts of service integration are the change of pricing strategy. As servitization implies that the risk is shifted towards the manufacturers this needs to be considered in the pricing. The pricing strategy should also consider both the product and the service and should lower the customer's TCO. Service integration also lead to several new ways of gaining competitive advantage since introduction of services facilitate companies to answer to an increased service demand from customers (Oliva and Kallenberg, 2003) and create differentiation (Heskett et al., 1997) and customization (Vandermerwe and Rada, 1998) opportunities. Servitized companies can thus leverage the fact that they provide extended, customer focused, offers that are differentiated from the competitors'.

Table 1. Identification of relevant concepts within each component of a servitized business model.

A Servitized Business Model					
Value Proposition	**Market**	**Value Chain**	**Value Network**	**Cost Structure and Profit Potential**	**Competitive Strategy**
Identify consumer main issues Handle customer processes Use technology as an enabler Define level of service	Specify segment Acquire customer insights Identify barriers Find innovators and early adopters	Develop capabilities within service, marketing, and delivery Develop capabilities to handle customer processes Specify communication channels	Develop and manage new customer touch points Identify and manage partnerships Account for risks related to close partnerships	Consider customer TCO Account for risk of ownership structure	Differentiate through additional services Increase customization opportunities

3 Method

This study is focusing on the development of a servitized business model to fit to the Chinese automotive market with a focus on the EV segment. To fulfill the purpose, the study included a review of previous studies on servitization as well as an empirical study of the EV industry and the characteristics of EV consumers in China. Further, interviews with industry representatives and area expert were conducted to increase contextual understanding of ongoing trends in the automobile industry.

3.1 Research Approach

The research approach was mainly qualitative, meaning that a deep understanding is created by collecting detailed information (Bryman and Bell, 2011). As a qualitative approach is suitable when a study aims to increase knowledge and facilitate idea-generation within a bounded area (Easterby-Smith et al., 2012), it was found to be an appropriate approach for this study.

The structure of the study is based on collecting data to answer research questions, derived from an identified purpose, and can thus be described as an inductive study as defined by Bryman and Bell (2011). This means that there was no initial hypothesis and that collection and analysis of empirical data impacted further theory research. However, to synthesize data, transcribed interviews were coded using various themes based on theoretical findings (see Chapter 3.4.1.4). Thus, existing theory was allowed to influence handling and interpretation of data, suggesting an abductive approach (Blomkvist and Hallin, 2015). The reason for doing this was to leverage on previous insights of the well-established business model concept, as the study aims to analyze implications of introducing a servitized business model.

3.2 Work Process

The research process followed 6 steps and is illustrated in Figure 4. Initially, the project included a problem identification and a definition of the topic. This was done through discussion with contacts at the collaborating company and the supervisor. Small modifications were made during the course of the project. Next step included a literature review intended to create understanding of the subject at hand and provide a background for the study. The literature review was then, in step three, used to create a framework later used for data processing and analysis. Step four consisted of data collection, both primary and secondary data. Primary data was collected through interviews with industry representatives as well as people from academia. Secondary data was collected through a desktop study. All data were then synthesized and analyzed based on the developed framework. Finally, the results were discussed, and a conclusion presented.

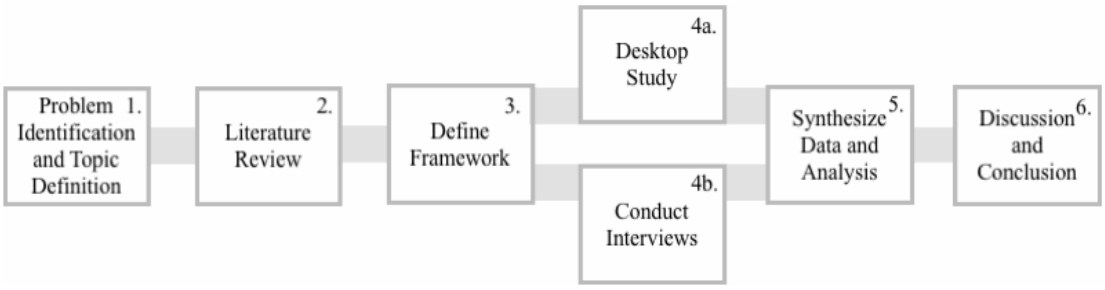

Figure 4. A graphic representation of the work process.

3.3 Literature Review

The literature review is crucial in creating an understanding of the topic at hand and should be clearly linked to the aims of the research (Hart, 1998). The literature review is also of importance when justifying the approach to the topic, research methods, and explaining the contribution of the study. It is necessary to always check the quality of the sources used as well as their relevance to the study (Levy and Ellis, 2006). Levy and Ellis (2006) identify three stages of an effective literature review: input, processing, and output. The input phase considers finding literature and evaluating its quality and applicability to the study. Processing is broken down into six parts, namely: know the literature, comprehend the literature, apply, analyze, synthesize and evaluate. The literature review should then lead to an output of arguments which are clearly motivated by the literature and provide the takeaways from the information processing phase. The structure of the literature review was chosen to be concept-centric, which means that information is sorted based on the topic rather than the source or chronology (Webster and Watson, 2002).

The literature review sets the tone for the rest of the study as it reveals the existing body of knowledge and the gaps that needs to be filled (Hart, 1998). The literature review was conducted in the early phase of the project. It was based on relevant theory fields identified in the problem analysis section. As the writers' knowledge level increased throughout the project as a result of readings and interviews, the theoretical framework was redeveloped and restructured several times throughout the project to cover relevant fields. The literature review will represent an important part of the study as it sets up the theoretical framework which will function as a frame of reference for the rest of the study. Articles were often found by using predetermined search words in digital data bases such as Google Scholar and ScienceDirect. Several general search strings were used, including *servitization*, *innovation diffusion*, *automotive industry*, *electric vehicles*, *business model*, and *customer experience*. Interesting articles often led to building block strategies, where some of its references were studied. Further, as a result from interviews with topic researchers, some articles were also studied based on their encouragement.

3.4 Information Gathering

Two different information sources were used: First, interviews with both representatives from the automotive industry and academia. Second, a desktop study investigating the current market situation and ongoing industry trends, primarily focusing on electrification and servitization within the Chinese automobile industry, and Chinese consumer behavior.

3.4.1 Interviews

During the project, ten interviews with eleven persons with different areas of expertise were conducted. It is possible to divide the proposed interviewees into two different categories: academia and industry. The purpose of this was to make a holistic empirical study, where an academic and an industry perspective were mapped.

3.4.1.1 Academia Interviews

In the academia category, four researchers were interviewed. These researchers were found by searching for researchers within the field of servitization and/or the Chinese EV market. Ten researchers were contacted but several declined an interview session due to lack of time or not

enough perceived knowledge based on the study's scope and purpose. Interviewees A3 and A4 were found based on references from others.

Three of the academia interviews were conducted very early in the project. These helped providing a deeper understanding of relevant subjects and also provided valuable advice on what literature the theoretical framework should contain. An overview of the conducted academia interviews is provided in Table 2.

Table 2. Overview of conducted expert interviews.

Interviewee	Research Field	Interview Focus	Duration
Interviewee A1	Ecodesign and Product-service Systems	Servitization and sustainable product-service systems	46 minutes
Interviewee A2	Integrated Product-service Solutions	General servitization and relevant literature	57 minutes
Interviewee A3	Sustainable Transport Management	EV adoption on the Chinese market	45 minutes
Interviewee A4	Solutions and Services in Industrial Networks	Services in the (heavy) automotive industry	43 minutes

3.4.1.2 Industry Interviews

The industry category included six interviews, one of which was conducted with two company representatives simultaneously. The interviewees were all currently employed in the automotive industry and had extensive previous work experience from said industry and/or working with servitized offers. The interviews aimed at mapping current value offers within the automotive industry, and the implications the transition towards electrification and servitization has on them. Another purpose of these interviews was to map various consumer preferences and anxieties regarding electrification and servitization that are identified from the industry perspective. To create a deeper understanding of the Chinese automotive market especially, two of the chosen interviewees were stationed in Shanghai. Furthermore, three of the interviewees were based in Sweden and two in Denmark. An overview of the conducted industry interviews is provided in Table 3.

Table 3. Overview of conducted interviews with representatives from the automotive industry.

Interviewee(s)	Work Field	Company	Interview Focus	Duration
Interviewee I1	Connected Services	Car Manufacturer A	Services as part of the value proposition	45 minutes
Interviewee I2	Consumer Services	Car Manufacturer A	Services as part of the value proposition	48 minutes
Interviewee I3 and Interviewee I4	Branding	Car Manufacturer A	Aligning consumer insights and branding	1 hour 8 minutes
Interviewee I5	Consumer Insights	Consultant (based in China)	Consumer behavior in large Chinese cities	1 hour 5 minutes
Interviewee I6	Customer Service Operations	Car Manufacturer A (Chinese branch)	Services as part of the value proposition	30 minutes
Interviewee I7	Strategic Advisor Environment	Car Manufacturer B	Implications of electrification and servitization in the automotive industry	51 minutes

3.4.1.3 Conducting the Interviews

The interviews in both categories were conducted similarly. Bryman and Bell (2011) argue that there are two main ways of conducting interviews in a qualitative study. Either unstructured interviews or semi-structured interviews. Unstructured interviews only determine the topics of discussion beforehand, resulting in interviews where the questions may both differ in order and formulation. Semi-structured interviews, on the other hand, determine the topics and questions beforehand but the order is undecided and there are possibilities for the interviewer(s) to pose follow-up questions to enable elaborations on various answers. The risk of unstructured interviews creeping out of scope was deemed too large, and therefore semi-structured interviews were performed. This also enabled the thesis writers to shift roles between interviews (e.g. who was leading the interview, who was taking notes, and who was posing follow-up questions and asking for elaborations), while maintaining similar structure.

As the interviews aimed to be explorative rather than comparative, the questions differed depending on the interviewees' area of expertise and/or work. All except three interviews (including those with the Chinese industry representatives) were conducted face to face.

3.4.1.4 Processing the Interviews

All interviews were recorded and transcribed. Transcription was performed to facilitate coding of the gathered data, i.e. organizing it based on common themes and concepts (Bryman and

Bell, 2011; Kvale and Brinkmann, 2014). In total, seven general themes were used. These were broken down into 39 different codes, based on content of the interviews, used to synthesize the data. The seven overlying themes were *General Servitization*, and the six components of the business model presented by Chesbrough and Rosenbloom (2002): *Value Proposition*, *Market*, *Value Chain*, *Cost Structure and Profit Potential*, *Value Network*, and *Competitive Strategy*. All 39 codes are presented in Appendix A.

The overall themes were initially meant only to be the six components of the business model. However, after studying the interviews thoroughly, the general servitization theme was added as this often became a topic of discussion not directly applicable to any of the business model components. Presentation of gathered data was later also based on the structure provided by the seven general themes.

3.4.2 Desktop Research

Secondary data is defined as data collected by someone else, and possibly also with another purpose (Ghauri and Grønhaug, 2010). This indicates the importance to consider the reliability of the sources and how the data should be interpreted. Using secondary data is a good way to save time and money as results from previous studies reduces the need to conduct own collection of primary data (Ghauri and Grønhaug, 2010; Eriksson and Wiedersheim-Paul, 2011). Research questions are often most efficiently answered using both secondary and primary data (Ghauri and Grønhaug, 2010). Secondary data is therefore viewed as an important source of data for this study.

There are two types of secondary data sources, internal and external (Ghauri and Grønhaug, 2010). Internal sources provide data from within a company such as invoices, internal reports and brochures and catalogues. External sources can be divided into published data, i.e. published material such as books and journal articles, and commercial data, i.e. data collected by commercial organizations to be sold (Ghauri and Grønhaug, 2010). In this study, secondary data were used to capture already existing knowledge of the Chinese automotive market. This was done by studying data presented in external market research reports. Information about Chinese consumer behavior were collected by reviewing previous studies. Data sources were identified using search engines (e.g. Google Scholar and Chalmers Library), and by consulting supervisors and area experts.

3.5 Quality of the Study

Lincoln and Guba (1986) propose four evaluation criteria to determine the quality of a qualitative study: Credibility, transferability, dependability, and confirmability. These concepts and how they relate to the study are presented below. Following this comes a more general discussion on the study's quality.

3.5.1 Credibility

Credibility revolves around how well collected data describes the phenomenon it aims to study (Lincoln and Guba, 1986). To ensure credibility of a qualitative study, mainly two methods are suggested: triangulation and member-checking (Lincoln and Guba, 1986). Triangulation, i.e. double-checking data through various sources, was to some extent performed in the study. All interviewees had extensive experience from servitization in general and their respective field in particular. A majority of the industry representatives came from the same organization but different divisions. This may lead to a biased view due to company policies and processes.

However, this was also used to ensure that answers were valid, as most interviewees to some extent knew what the others' roles were. Thus, similarities could be identified. Further, recording, transcribing, and coding of all interviews removed the risk of misinterpreting the interviewees' answers. Both authors took part of all steps in the work process, ensuring a member-checking, where cases of different interpretations and opinions were discussed and solved.

To increase the credibility of the study interviews with additional actors could have been conducted. Interviews with more automobile actors could have acted as an increased triangulation and provided more credible results regarding the industry perspective. A focus group(s) could also have been held to confirm interview results (Bryman and Bell, 2011). Interviewing actors operating within battery development could have increased understanding of the pace of which price and range of batteries is developing. Finally, a quantitative survey could have been used to map consumer opinions on specific topics (Bryman and Bell, 2011), e.g. what services are preferred in large Chinese cities.

3.5.2 Transferability

Transferability has to do with a study's generalizability, i.e. how applicable the findings are in another context (Lincoln and Guba, 1986). It is not a researcher's responsibility to ensure transferability, but rather transparently describing working methods and processes to enable others to judge this criterion (Lincoln and Guba, 1986). It is ensured by clearly describing methods of data collection and work process. Whereas this chapter aims to do this, it must be mentioned that some answers and follow-up questions touched upon company secrets on which insights were only obtainable under non-disclosure agreements between the paper's authors and the collaborating company group. Thus, some company specific (secret) examples were provided during the interviews. These were then translated into more general opinions and concepts, thus enabling findings to be applied in non-company specific contexts as well.

3.5.3 Dependability

Dependability of a study depends on how consistent the connection between raw data and presented findings is (Lincoln and Guba, 1986). Both authors worked parallel with similar tasks throughout the study and results (i.e. pieces of text) were then read and discussed, speaking for the dependability criteria (Lincoln and Guba, 1986). This method was, except for a few exceptions, e.g. when writing some parts of the theoretical framework, applied during the whole project. Lincoln and Guba (1986) also mention a code-recode approach, i.e. recoding results after a couple of weeks' time. As coding was performed by both authors simultaneously, and with the codes being founded in theory extensively studied by both authors (i.e. the authors had a deep understanding of the meaning of the codes), this was deemed unnecessary.

3.5.4 Confirmability

Confirmability relates to how objectively data has been interpreted (Lincoln and Guba, 1986). They propose the audit strategy as the main strategy of reaching this. The audit strategy involves an external researcher interpreting the data, and the aim is that he or she reaches the same conclusions based on the presented work process. This was not done, but instead, as previously stated, the report's authors worked parallel and reached a common conclusion whenever initial interpretation differed.

As it was chosen to code the transcribed interviews based on existing literature (components of Chesbrough and Rosenbloom's (2002) business model), the risk of letting the author's subjective opinions on what interview data was important affect results was mitigated. Instead, data was interpreted based on established business model-related theory.

4 Findings

This chapter includes results from the performed desktop study, and the conducted interviews. The results are also analyzed using the report's theoretical framework.

4.1 Characteristics of the EV Industry

The following section aims to provide insights on the EV market in general and the Chinese EV market in particular. Governmental policies are seen as one of the main facilitators of EV adoption (Wang et al., 2017) and a short description of these are provided. It also describes market specific characteristics, anxieties, and opportunities that EV manufacturers must take under consideration when shaping their business model. Finally, three studies specifically on the Chinese EV consumers are summarized.

4.1.1 The Chinese EV Market in Numbers

605 500 plug-in passenger cars were sold in China during 2017 (EV-Volumes, 2018). This meant a 73 percent increase from 2016. 24 800 of the sold EVs (4 percent) were imports, with Tesla being the largest foreign supplier. Prognostics for 2018 show an expected increase of EV sales of 50 percent and an increased share of the entire market from 2.4 percent to 3.6 percent. Figure 5 illustrates the increase of annual sales of plug-in electric vehicles on the passenger car market in China from 2015 to 2017 as well as a forecast for 2018. Furthermore, battery electric vehicles (BEVs) are expected to represent 82 percent of the market in 2018 while plug-in hybrid electric vehicles (PHEVs) are expected to represent the last 18 percent.

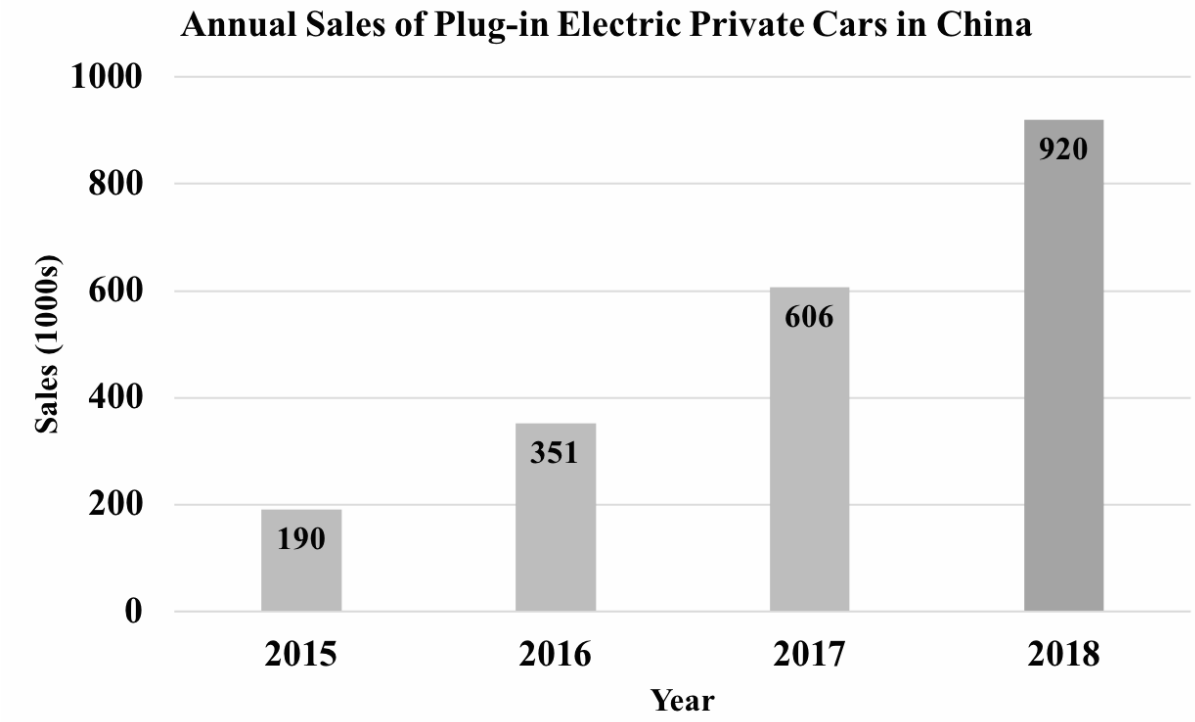

Figure 5. Annual plug-in electric vehicles sales in China 2015-2018. 2018 sales are forecasted (EV-Volumes, 2018).

4.1.2 Government Policies Concerning EVs in China

Government instituted regulations have a significant impact on the adoption of EVs. Lin and Wu (2018) summarize the most relevant policies in the following four points:

A direct subsidy is provided by the government for the purchase of EVs: Depending on the driving range of the vehicle a person can receive $3900-8600 in subsidies from the central government. Additional subsidies can then be received from local governments and in total, subsidies can reach 25-60 percent of the vehicle purchase price.

Tax deduction and exemptions related to EVs: Taxes related to the car purchase, the vehicle ownership and tolls are impacted by these regulations. The purchase tax can account for 10 percent of the price of the car.

License plate lotteries arranged to limit the number of vehicles: To get a license plate, car consumers in several cities have to go through a license plate lottery. EVs are exempted from these lotteries. In Shanghai, for an example, owners of EVs can get their license plates for free, instead of having to pay $12 500.

Traffic control during heavy smog: As a result of the heavy smog the government has implemented traffic control restricting the number of cars on the road during certain days. EV owners are exempted from these restrictions.

4.1.3 Characteristics of EV Consumers

There are many potential consumer motives to buy EVs, e.g. factors relating to the environment and energy security (Heffner et al, 2017), status benefits (Olson, 2018), or benefits from government intervention (Baan et al., 2017).

In a study by Axsen et al. (2016) three types of EV consumers are identified to describe behaviors connected to purchase and ownership of EVs. The first category is called Pioneers and consist of consumers who already own a plug-in EV. Potential Early Mainstream are the second group which consist of consumers who have stated an interest in and are likely to purchase an EV within the next 10-15 years. Finally, the Late Mainstream are those consumers who have not stated an interest in purchasing an EV and thus are not likely to do so within the next 10-15 years. Comparing these types of groups shows that Pioneers usually have higher income (Axsen and Kurani, 2013; Tal and Nicholas, 2013; Plötz et al., 2014), they are most often middle-aged and male (Plötz et al., 2014), and they are likely to be multi-vehicle households (Kurani et al., 1996). Madina et al. (2016) mention home charging as the preferred choice due to the convenience and cost advantages. There is also research showing that most early EV adopters, i.e. those who already own an EV, mainly charge their vehicles at home (Kieckhafer et al., 2017). It is further shown that consumers who already own EVs have a higher concern for the environment than those who only consider buying an EV (Axsen et al., 2016). Studies in Canada (Axsen et al., 2016) and the U.S. (Axsen and Kurani, 2013; Carley et al., 2013) further show that Potential Early Mainstream consumers prefer PHEVs over BEVs whereas Pioneers prefers BEVs.

EVs are also related to several consumer anxieties. Limited driving range (Olson, 2018), difficulties to charge (Sheet al., 2017), and purchasing price (Carley et al., 2013; Helveston et al., 2015; Olson, 2018) are some main reasons for consumer anxieties. The first two anxieties

explain why EVs are more popular in cities where driving distances generally are shorter (Fontaínhas et al., 2016). Sensitivity related to controlled charging, i.e. regulations for charging hours, also differs between the group who already owns EVs and those who do not. Studies made in both Canada (Axsen et al., 2016) and the U.S. (Axsen and Kurani, 2013; Turrentine et al., 2011) show that those who already own a plug-in EV are more sensitive to the guaranteed minimum charge, i.e. available hours of charging time.

Whereas above insights regard EV consumers in general, there are also studies made specifically concerning the Chinese market. Helveston et al (2015) studied the impact of subsidies on EV adoption and makes a comparison between the U.S. and the Chinese market. According to the study, Chinese consumers are showing high interest in adopting EVs. The widespread use of electric bicycles could mean that the transition to charging cars by plug-in technology will face less resistance. In their report, they argue that Chinese consumers, compared to U.S. consumers, are relatively sensitive when it comes to acceleration time, operating cost, and fast-charging capabilities. In the higher income and education segment a relatively high sensitivity towards operating cost could also be noticed. Further, large households tend to be less price sensitive and consumers owning multiple cars have a more positive attitude towards the BEV technology. The authors argue that there is a strong correlation between environmental concerns and a positive attitude towards EVs, however EVs may not be viewed as high-status symbols in China. It was also found that Chinese consumers' willingness to pay for the BEV technology is lower than that for combustion engine driven vehicles and, depending on the range, consumers are willing to pay $0 to $10 000 less for this technology. In comparison to U.S. consumers, Chinese consumers are willing to pay significantly more for a decrease in operating cost and decreased acceleration times. No clear preferences are shown for either BEVs or PHEVs. They also show that in a situation with no subsidies, BEVs are much more competitive on the Chinese market relative to the U.S. market and that Chinese consumers, relative to U.S. consumers, are more willing to adopt mid-range PHEVs.

Baan et al. (2017) conducted an extensive study of Chinese automobile consumers concluding that they are becoming more demanding. Premium is a trend amongst Chinese automotive consumers and a large share out of those who bought new cars in 2016 (55 percent) chose a more expensive one than their previous. However, the perception of cars as status symbols is no longer as strong as it previously was, even though young people and owners of expensive cars are more likely than average consumers to see them as status symbols. The support of local brands differs between parts of China but are the strongest in Northern China. An increased support for local manufacturers is seen in the EV segment as well. Brand loyalty is not seen as a priority for Chinese consumers, however young people represent the most loyal segment and premium brands have the most loyal customers. Some trends seen amongst young consumers are higher standards for connectivity, a more positive view on car sharing services, and the fact that owning a car is not as important as it used to be. Connectivity is viewed as an essential feature and 62 percent of consumers are willing to pay extra for subscriptions of in-car services. A majority of the consumers would switch brands if the necessary in-car services are not available in the offer from their current brand. Consumers are also showing more interest in digital solutions for the process of purchasing a car even though most deals are still made at authorized car dealers. The used car market is gaining shares but are still nascent relative to other car markets. Consumer skepticism towards used cars are connected to the cars history and safety issues.

Baan et al. (2017) further explains the specifics of the EV segment and conclude that in China, the demand for new energy vehicles are highly driven by license plate restrictions for cars with internal combustion engines. This leads to EV consumption being concentrated to those cities which have instituted regulations. The study shows that 20 percent of consumers are interested in purchasing a new energy vehicle (NEV). Interest in purchasing electric vehicles correspond to household income as consumers with an income exceeding $3900 a month are three times more likely to invest in an EV then a consumer with an income ranging between $630 and $1900 a month. Positive aspects of owning an EV as mentioned by consumers are exemptions from 'no drive days' and license restrictions, free use of city-wide charging service platforms and cost savings for fuel. On the other hand, in 2017 consumers mention quality and safety of EVs as well as the time for charging as the top reasons for not purchasing an EV. However, in 2016, the scarcity of charging stations and high price were the main reasons. The authors argued there would be a significant increase in interest in buying EVs if prices dropped to the level of internal combustion engine models or if the driving range was increased. Noticeable was also that only two thirds of EV owners have the possibility to charge their vehicles at home.

In a study including four Chinese tier 1 cities (Beijing, Shanghai, Guangzhou and Shenzhen), Lin and Wu (2018) investigated the impact of demographic and emotional factors on the willingness to purchase EVs. Intention to buy EVs could be derived from two different types of factors: demographic factors and emotional factors. Included in demographic factors are population characteristics such as gender, age, educational level, marital status, income level, and geographical variables. Emotional, or attitude, factors relate to network externality, performance, price acceptability, usage cost, government subsidies, concerns about smog, and charging infrastructure. Network externalities are connected to the social influence on EV purchase and performance parameters imply consumers perception of EVs in comparison to traditional cars. Age proved to play a significant role as older consumers were generally less interested in purchasing EVs. Marital status proved to have a positive impact on the willingness to purchase EVs. The willingness to purchase EVs showed to have no significant relation to educational level, income level, and car ownership. Price showed a significant impact on the intention to purchase EVs and the authors argue that EV sales price has reached an acceptable level. The EV performance also impact the purchasing intention. The study further showed that the usage cost played no significant role in the purchase decision (ibid).

4.2 Servitization

Several insights on servitization at a general level were provided during the interviews. Interviewees A1 and I7 emphasized that, on a servitized market, focus is on functionality of the solution rather than technical specifications or visual appearance. The section aims to provide general insights on servitization to provide context to the following sections and subsequent discussion chapter.

Benefiting from servitization requires companies to face and overcome various obstacles. It is deemed important to align new business models with a service offer to benefit from servitization. A drawback of the previously mentioned "Power by the Hour" Rolls Royce example is emphasized by Interviewee A4:

> "*When the airplanes land they somehow need to be stopped. Basically, you have maybe three different forces to use when doing this: Braking the wheels, you can work with the flaps on the wings, and you can work with the engines and reverse forces there. What*

> *happens if it becomes free, or a fixed fee, on using the engines? Well, then you stop wearing down the brakes and use the engines instead. So, you have to think one step further.*" – Interviewee A4

Further, there has to be a clear connection between the core product and how surrounding services are shaped, argued Interviewee I4. On a similar note, Interviewee A2 pointed out that manufacturing firms that converts from being product-centric to service-centric face the risk of losing core competences. Relevancy is deemed important. A risk of adding irrelevant services was identified by Interviewee I3:

> "*And I remember taking a group out and they had never seen their consumers actually use their product. So, they had never actually seen a person interacting with their product and their services and they were like 'But they don't use anything.'*" – Interviewee I3

Thus, there exist a risk of spending resources on extra services neither used nor wanted. The importance of customer interaction in the development stage is therefore emphasized. Several interviewees (A3, I1, I3, I4, and I7) suggested that the key to succeeding in developing relevant services facilitated by understanding customer needs and preferences.

> "*How do you capture a [customer] behavior […], and how do you turn it to something good that helps this customer?*" – Interviewee I1

The importance of technological progress to facilitate servitization was brought forward by interviewees A1, A4, and I1. Within the automobile industry, connectivity (i.e. internet communication with vehicles) allows for vehicle bound features to be controlled remotely and enables health tracking and diagnosing of vehicles. Interviewee A4 also pointed out that this could be used to shape business models when e.g. insurances and services are to be part of the offer.

Interviewee I7 stated that gradually letting customers try out the new ownership structure, without over-pushing it, may be a successful strategy:

> "*Slowly letting people notice, without telling them, that 'Well, not owning a car is not too bad, is it? It actually went very well.'*" – Interviewee I7

Similar arguments were brought forward by Interviewee A1. The market needs to be taught that not owning a product, but rather paying for functionality, actually works. The customer must try the solution before full diffusion can be reached. A number of successful examples were brought up, including Volvo Cars' initiative *Sunfleet*. This approach was not found in the studied theory.

As noted by interviewees A1 and A2, servitization is more common in B2B markets than B2C markets and theory is founded in a B2B context. Especially Interviewee A2 noted that this may impact how applicable servitization theory is in the automobile industry. Interviewee A1 expressed that examining implications of servitization in the (electric) car industry is interesting as it is one of the first B2C markets where the core product that is facing servitization is considered relatively expensive. As the servitization trend in the car industry can be considered

rather new, Interviewee I7 pointed out that customer preferences and use patterns may change and new parameters need to be analyzed:

> "*And then, probably, there will be new user parameters that control [development], what needs to be tightened and where can you slack?*" – Interviewee I7

Both Baines and Lightfoot (2013) and Cherubini et al. (2015) emphasize the importance of technology enablers for successful servitization processes. In the automotive industry, main technology enablers are related to connectivity and vehicle diagnosing. However, as a consequence of this technology development, a risk of adding too many different services is identified among the interviewed industry representatives as it is done with ease. Slack (2005) argues that services are harder to design than products. Therefore, understanding the product-service continuum (Baines et al., 2009) and what customers value become increasingly important.

Given that various services are currently designed for in the physical car (e.g. digital keys) it can be argued that a PSS may become evident. As this is said to increase the adoption rate of EVs (Cherubini and Lasevoli, 2012), further development in this area is suggested. PSSs are also said to be successful on markets driven by quality and added value (Mont, 2002).

Adding relevant services that customers appreciate is an expressed aspiration. However, this is considered a challenge since new user parameters are not yet fully identified and understood. Using the distinction between services that support the product and services that support the customers' processes (Oliva and Kallenberg, 2003; Antioco et al., 2008; Rabetino et al., 2015) combined with a distinction between technical and non-technical services can (Juehling et al., 2010) help categorize this problem.

4.3 Value Proposition

The value proposition describes what should be included in the offer and how this benefits the customers (Chesbrough and Rosenbloom, 2002). To create a valuable offer, customers problems and values needs to be identified.

From a customer point of view, servitization increases perceived value. Customization and flexibility of servitized options were considered positive implications by interviewees A4 and I4:

> "*A service is much more valuable, and it shapes itself around you in a different way. So, typically within, within most industries, customers feel that they have added amount of flexibility and added amount of personal attention. You can deselect stuff and select stuff.*" – Interviewee I4.

The automobile market of today is characterized by several different technical trends such as automation, digitalization, connectivity, and electrification (Interviewee A4). It is, per Interviewee A1, also fairly impacted by urbanization and an increasing awareness of environmental issues. Interviewee A1 argued that it is also thought that the consumer is demanding more flexibility and is less focused on the attributes of the actual car.

Interview answers show the importance of gaining knowledge about consumers' problems to shape valuable offers. As brought up by interviewees A1 and A2, a common example when talking about the automobile industry is the consumers' need to move from point A to point B. Interviewee A1 explained that, traditionally, consumers would purchase a car to be able to perform the task of moving between different locations. However, in a service-based offer a company would simply sell the trip itself using the technology, i.e. the car, as an enabler for this. This means that the customers do not need to own their vehicle but will rather pay for the utilization of it. Interviewee A1 mentioned leasing agreements as an example of a servitized offer where the consumer does not own the car.

> "*We will perhaps not be as interested in what engine power the car possesses or exactly which color it has. I mean, we don't choose a taxi based on the engine power or what color it has or which interior design it has. You want it to move from A to B quickly. And that is what we will focus on more.*" – Interviewee A1

When shifting the value proposition, suppliers need to increase their knowledge about the consumers and the main issues that they want resolved. Interviewee A2 stressed that it is up to the customer to define what is valuable to them. For an example, for some customers the ownership itself is what brings value and in this case a servitized offer is less appealing. Consumer needs can be related to the car itself but also to other problems they face in everyday life. Interviewee I1, I2, and I3 described that, from an industry perspective, the integration of services offers a major possibility for automobile manufacturers to provide consumers with additional value. To create true value for the customers, companies are leaning more and more towards working with problem solving activities rather than just selling a product. According to Interviewee I1 services allows companies to quickly adapt to customer needs and evolving problems. In comparison to a product, a service offer is, according to interviewees A2 and I1, normally much more flexible, which is an important feature for services to be relevant. As expressed by Interviewee I2 the goal of services is to create a hassle-free car experience where the consumes are ridded of all problems related to owning a vehicle such as maintenance, repair, washing, parking, and so on.

Interviewee A2 argued that servitization does not necessarily mean that the product is only sold as a service but could simply mean that services are integrated in the product offer. Examples of this in the automotive industry is maintenance and repair services related to the car or services related to the connectivity of the car, i.e. connected services. Modularization was mentioned by Interviewee A4 in the same context as a way for suppliers to make it possible for customers to only choose the services that fits their needs. The level of service was also mentioned by interviewees I1, I2, I3, and I4, who all talked about selling the car itself as a service as well as examples of offers where customers buy the car and then pay for complementary services.

Services could be categorized in several different ways. Interviewee I1 made a distinction between product related and consumer related services. In this case the product related services are somehow connected to the vehicle itself, such as a remote climate control, while the consumer related services are more related to consumer issues, such as an in-car delivery service. Services could according to interviewees I1 and I2 also be defined by whether they are must haves or if they provide something extra to the consumer, e.g. a delight. Interviewee I1 described different parts of an offer as must-haves, performers, and delights. The latter is often what distinguishes one offer from another. However, something that was once considered a

delight can become a must have as the consumer realizes new needs and values. Connected services is yet another type of service classification, proposed by interviewees A3 and I1. In this case connected services are all those services related to the connectivity of the car, e.g. its ability to connect other products via the internet.

> "*[...]what are must haves, what are performers, and what are delights, in this area. And sometimes we talk about things which might end up on the delight scale which is just 'woah', wait a minute, this is a must have in the BEV discussion*" – Interviewee I1

Several of the consumer benefits of a service-based offer are related to the ownership structure as argued by interviewee A1, A2, A4, I6, and I7. In the case where consumers only pay for the utilization of a vehicle, a lot of the risk is shifted towards the supplier who according to Interviewee I6 becomes responsible for the condition of the vehicle. For the customers, it also removes the uncertainties related to the car's end of life (Interviewee A1) and value depreciation (Interviewee I7). Value is thus created by removing customers risks relate to car ownership.

Every market has its own characteristics impacting the consumer needs and thereby perception of value. Some of the main consumer issues on the Chinese market identified by interviewees A3 and I5 relates to the struggles to get license plates, dedicated driving days, and a lack of parking spots. Some issues are according to Interviewee A3 directly related to the technology. Such an example is the possibility to charge at home, which not all people can do, and the limited range connected to electric batteries. Congestion is another problem which, according to Interviewee I5, makes it more convenient for a lot of people to take the metro. Other transportation modes such as plane or high-speed trains are mentioned as popular alternatives for longer trips indicating that car manufacturers need to identify for when the actual need for a personal car arise. When developing an offer companies thus need to consider the environment within which it will be consumed and who the actual customers are.

> "*Most people will say it is because of financial reasons. Because the electric car gets, it gets a lot. Especially in big cities. They have a lot of hinders for driving a regular car. So, if you buy an electric vehicle, then you can get a free license plate, which is a very very big advantage because a license plate costs more than a car.*" – Interviewee A3

It is evident from the empirical results that the perception of value is relative, and customers will thus value an offer in different ways. An example of this in the automobile industry is whether ownership itself is perceived as a value or if the ability to move between points is what brings the actual value of a car. To be successful on the market, companies have to find ways to adapt their value proposition to their customers' demands. The value proposition is considered a vital part of a company's business model and has to be aligned with the rest of its components (Chesbrough and Rosenbloom, 2002; Morris et al., 2005; Osterwalder and Pigneur, 2010). Since the value proposition is designed to provide the customer with certain benefits it is important to have a clearly defined customer. In this way there is a strong connection to the market component. The results show that companies use their value proposition to differentiate one offer from another making the value proposition a direct result of the competitive strategy.

Baines et al.'s (2009) defined product-service continuum can be exemplified by how manufacturers in the automotive industry operate and the change that the industry is going through. Both the literature review and the empirical study reveal that companies are switching from traditional product sales to becoming more service focused. Several types of offers in today's automotive industry such as leasing agreements and carpools are examples where the customer no longer buys the product at all but simply pays for the means of transportation. Another alternative is that customers pay for the car but are also offered additional supportive services such as maintenance and repair, washing, and various connected services. These types of services could be related to what Baines and Lightfoot (2013) call base services and intermediate services. Such service integration is thus an example of a servitized business model where the ownership structure is unchanged.

To comply with a broad spectrum of continuously changing customer demands companies need to become more agile and flexible. The Chinese EV market represents a case where customers' perceptions of value differ. For an example, different studies indicate more or less significance of the operating cost of the vehicle. Different studies also point to different significance of other factors such as income level and car ownership. Manufacturers are thus forced to consider offers with a high focus on lowering customers operating costs as well as offers which are more focused on the initial cost.

Providing services has become a way to extend the product offer and the results show that services creates an opportunity for manufacturers to create additional value. The shift towards servitized offers is, as stated in the interviews as well as in previous studies (Baines et al., 2009; Sakao and Lindahl, 2009), accompanied by an increased focus on problem solving. For the automotive industry this means that manufacturers turn their focus from the car itself to the finding solutions to their customers transportation needs. As identified by Baan et al. (2017) problems related to charging, price, and safety where concerns about EVs expressed by Chinese automobile consumers. Manufacturers thus need to find solutions that solve these problems, e.g. provide charging assistance and education about safety. Congestion and parking issues are other problems brought up during the interviews which potentially could be solved by additional services such as dedicated parking spots. Manufacturers also need to deal with the fact that there are alternative modes of transportation. This means that the car and potential related services needs to fulfill consumer needs which cannot be fulfilled by the other modes.

In the literature a distinction is made between services that support a product and those that support a process (Oliva and Kallenberg, 2003, Antioco et al., 2008; Rabetino et al., 2015). Within the automotive industry this could reflect services with a direct connection to the car such as maintenance and repair and those services constructed to solve identified consumer issues. This could also be confirmed during the study of the industry in which a distinction was made between car related services and consumer related services. Baines and Lightfoot (2013) argue that a servitized offer means an integration of advanced services. The car related services described during the interviews puts more responsibility on the manufacturer and thus resemble those services described by Baines and Lightfoot (2013) as advanced services. As EVs normally require less maintenance, services directly to the car might decrease. However, there are several uncertainties related to the operation of the car, e.g. charging and range, which could increase the amount of services focusing on the customers processes related to the car.

Previous studies show that car ownership is sometimes seen as a negative due to irregular maintenance costs and costs for spare parts (Lim et al., 2012; Mahut et al., 2015). Struggles related to the cars end-of-life could be yet another reason for consumers to adopt offers where

they do not own the car. This is especially evident in the EV industry as the second-hand market is still relatively unexplored. For the manufactures this means a change. The shift of ownership structure indicates that the manufacturer should put more focus on the car end-of-life phase. This supports the argument by Rabetino et al. (2015) that the importance to consider a life cycle perspective increases when implementing a servitized business model. The study by Baan et al. (2017) showed that Chinese consumers are sceptic towards used cars thus making it harder to sell old cars when switching to a new one. This problem could be eliminated for the consumers through a servitized offer where the customer does not own the car or gets help to guarantee the state of the car and remove safety issues.

Baan et al. (2017) conducted an extensive study of the Chinese automobile market which showed that license plate restrictions was one of the main drivers of EV adoption. Exception from governmental regulations can be seen as a value related to EVs. However, this is also a factor which is hard for companies to control and there is no direct relation to servitized offers.

4.4 Market

As previously described the market element includes the different market segments and the characteristics of customers within each segment. Based on the interviews several characteristics of the EV market in general has been identified as well as examples of how it could be segmented. Furthermore, the results also describe what distinguishes the Chinese EV market.

The automobile market can according to several interviewees (A3, I2, I4, and I5) be sorted into different types of segments based on e.g. demographics or geographical location. For a supplier it is according to Interviewee I1 vital to identify the customer segments and the characterizing behaviors within these segments. Only by defining the segment can the appropriate offers be developed.

Interviewee I4 explained that consumers can be segmented by regions such as the U.S., the European, and the Chinese market. However, these markets are normally narrowed down to properly specify the target segment. The term ‘hyperlocal’ was used to describe marketing efforts dedicated for regions as narrow as a certain part of a city. When targeting a group of customers, interviewees I3 and I4 stated that it is important to find common ground and define the values that are shared between the supplier and the customer. Grouping of customers can, according to interviewees I1, I2, and I5 be done in several different ways. Examples of identified consumer attributes are whether or not they have an active lifestyle (Interviewee I2), what age group they belong to (interviewees A3, I1, and I5), whether they have an interest in technical solutions or service solutions (Interviewee I2), the size of the household (Interviewee I5), financial status (interviewees A3 and I5), view on social status (Interviewee I5), and driving behaviors (Interviewee I5). Only when such factors have been identified for the target segment, appropriate offers can be developed. The segment will not only impact the offer itself but will also help shape the marketing activities.

> “*So, we are trying to create a community of people who meet us on a brand value level. So, it’s attention to detail, perfectionism, all these kind of things.*” – Interviewee I4

When it comes to EVs, the market’s understanding of the technology and its implications is, according to Interviewee I7, still not considered to be fully developed. Interviewee A1 stated

that consumers still have trouble comparing costs over an entire product life cycle which deludes the comparison with traditional combustion engine vehicles. There is still a huge focus on the environmental benefits of EVs even though a case can be made for financial ones as well. Something that was pointed out by several interviewees (A3, A4, I3, and I7) is that the battery development is still seen as one of the most important issues for the EV segment and its competitiveness relative to the rest of the automotive market. When introducing new types of offers, interviewees I3 and I4 argued that it is important to consider the social maturity and the willingness to adopt new ways of thinking, thus searching for these types of customers becomes highly important for innovating suppliers. In China, Interviewee I5, identified young people as the most prone to adopt innovations. When targeting a group of customers, interviewees I3 and I4 expressed that it is important to find common ground and define the values that are shared between the supplier and the customer. During the interview with interviewees I3 and I4 it was described how companies can use so called taste makers and opinion leaders to reach their final customers. Taste makers and opinion leaders are people who share similar values and that have influence over a specific market segment.

The servitized business model is not applicable on all markets as consumers' attitude towards car ownership varies between the segments. Interviewee I4 explained that in some areas such as California or New York, car ownership is considered excessive and unnecessary. Focusing on the Chinese market, several important characteristics has been identified. To start with, due to the size of this market it is according to interviewees A3 and I5 impossible generalize the attributes of the market. According to Interviewee A3 a primary division that is often made is the categorization of different tiers where tier 1 represents the largest cities and tier 4 represents the smallest. It is primarily in tier 1 and tier 2 cities that EV adoption is relatively high. Believed reasons for this are that it is easier to get a license plate in tier 3 and tier 4 cities even without purchasing an EV and the fact that the purchasing power is not the same.

> "*In China it is very, call it a central concentrated and regulatory driven market. It means that those, those who buy electric vehicles lives in the big cities.*" - Interviewee A3

> "*So, there is not much incentive to buy an electric car [in tier 3-4 cities], and it's not certain that it's cheap.*" – Interviewee A3

When talking about the adoption of EVs in China, both Interviewee A3 and I5 mentioned the presence of governmental subsidies as one important factor which is creating a huge incentive for people to purchase EVs. This is strongly related to financial incentives as people who buy EVs get tax reductions and are exempted from the cost of buying a license plate. Another characteristic of the Chinese market is, according to Interviewee A3, that it is dominated by domestic brands. Furthermore, environmental issues were mentioned by Interviewee A3 in relation to EV adoption but not as one of the main reasons. The interviewee also mentioned that the number of users of a service is often more relevant than the performance of the service itself. In China, service-based models such as renting, and subscription are very new and is, especially in the older demographic, considered as an anomaly since car ownership is related to social status and something that you should strive for. However, the Chinese market was also described by interviewees A3, I4, and I5 as quickly changing and especially young consumers are considered very prone to adopt new innovative technologies and concepts. Interviewee I5 mentioned that China is changing in terms of economy, household structures, and living locations creating a need for companies to continuously follow and adapt to the development of the market.

> "*The stigmatization is that it [not owning a car] is lower tiered. But then you have a new wave, which is saying 'I'm not an idiot. I don't care about the car, I care about what is there for me at the moment and I need it in that specific context.*"' – Interviewee I4

Interviewee A3 provided some concluding thoughts. Demographic population trends drive the growth of MaaS (Mobility as a Service). Several car sharing and bike sharing services are growing, mostly in tier 1 and tier 2 cities. Often, these use local vehicle manufacturers. The purpose of MaaS is to reduce pollution and traffic, and therefore electric vehicles are often used. With bike sharing services, the problem of users not being careful when handling the bikes has been recognized.

In line with the literature review and the empirical results the market element is described as the characteristics of a certain segment of customers. With the growing importance to adapt to consumer needs it becomes even more important to understand and react to the market environment. Customer categorizations similar to those described during the interviews has been made in previous studies of the EV market. Lin and Wu (2018) for an example discuss demographic and emotional factors that could distinguish customers and impact their willingness to adopt EVs. Baines and Lightfoot (2014) on the other hand take a different approach by describing customers as either 'do it themselves type', the 'do it with them type', and the 'do it for them type'. The last type demands more services and can thus be seen as most the most appropriate target segment for service suppliers.

In a broad perspective EV consumers can be considered as a segment of the entire automotive market. Based on the empirical study several attributes of this segment have been identified. One common attribute of EV consumers is a relatively high environmental awareness. The willingness to adopt EVs are also linked to factors such as financial situation, household size, and regional governmental subsidies. Industry representatives describes the importance to consider the social maturity when offering new innovative services. The EV segment is still facing several obstacles such as purchasing price (Carley et al., 2013; Helveston et al., 2015; Olson, 2018), charging infrastructure (Sheet al., 2017), and limited driving range (Olson, 2018) showing that the market is yet to be fully developed. This signals that EV manufacturers still have to focus on the consumers which are described by Rogers (2003) as Innovators and Early adopters. The first group is described as risk takers with an eagerness to try new technologies whiles the second group are more mainstream and often considered as opinion leaders. Similar strategies were identified during the interviews where so called taste makers and opinion leaders were located and approached to spread knowledge about the brand.

On the Chinese EV market, the growth of MaaS is evident. Several reasons for this are identified. Of Baines et al.'s (2009) identified main drivers for servitization, the strategic drivers seem to be the most significant. Servitization, to some extent, seems to be desired by the market as owning a car is related to various issues. Without being industry specific, this is also considered one of the main drivers for servitization (Vandermerwe and Rada, 1988). Further, the rapid increase of small domestic EV actors with innovative business models (Wang et al., 2017) can be seen as a result of servitization, being a powerful mean of differentiation (Vandermerwe and Rada, 1988; Baines et al., 2009), especially powerful in growing markets (Bustinza et al., 2015).

Frow and Payne (2007) argue that only by carefully studying different market segments can the customer experience be improved. It is also evident that the choice of market will have major implications on a company's offer development and marketing efforts. The Chinese market, as shown by previous studies, exhibits several distinguishing characteristics that will impact companies that want to target this segment. Examples of such factors are: governmental policies, rapidly changing economic climate and household structures, and traditional views on car ownership. As Barnes et al. (2017) argue, customer knowledge is vital when developing a value proposition. There is also a close relationship between the choice of market segment and the marketing efforts. The empirical results show that companies strive to find consumers with similar values, which in the EV discussion often relate to sustainability, and thus need to be able to clearly communicate those values through the right channels. While Helveston et al. (2015) argue that environmentalism is a strong driver for EV adoption in China, the interview results show that this is not one of the main drivers. Manufacturers might therefore need to find additional values related to the willingness to adopt EVs. Different segments will also result in different levels of customer relationships (Baines and Lightfoot, 2014).

A common segmentation of the Chinese market is based on the four city tiers. As the EV adoption is larger in tier 1 and tier 2 cities the analysis mainly regards these specific markets. A major point to make about the Chinese market, even when narrowing it down to the major cities, is that it is impossible to make major generalizations. However, previous literature and the empirical study show that there are some recurring characteristics to consider when studying the Chinese EV market. The most important identified driver of EV adoption is governmental incentives in the form of financial subsidies and easier access to license plates. Environmentalism is often brought up in the literature as a reason for or EV adoption (Taghaboni-Dutta et al., 2010; Cao, Wu, and Zhou, 2013; Helveston et al., 2015; Rostamzadeh, et al., 2015; Heffner et al, 2017) however the empirical study shows that it might not be one of the main drivers. The interview results show the importance for innovative automobile manufacturers to find market segments that are receptive to new technologies and types of offers. Several such segment characteristics have been connected to the Chinese market including high income, young age, and large households. However, some studies argue for less significance of such factors speaking to the volatility of the market.

When it comes to servitized offers on the Chinese market the empirical study shows that companies still experience a resistance towards renting and subscription models which is partially a result of the status related to car ownership. According to Baan et al. (2017), young people and those who invest in expensive cars are most likely to view cars as status symbols. However, interviews with industry representatives indicate a higher innovation acceptance grade among the younger generations making them a possible target for servitized offers. It is pointed out that China is rapidly developing. For automobile manufacturers, this indicates a need to be agile and adaptable to a changing market environment.

4.5 Value Chain

The value chain consists of the set of internal activities which are necessary to create and deliver a product or service (Porter, 1985). All interviewees agreed that transitioning towards servitization requires a new set of internal resources, capabilities, and competencies for manufacturing companies. Interviewee A2 suggested that converting to a service provider leads to a redefinition of what customer value and therefore requires the company to understand this:

> "*I mean, I believe the difficulty lies in, partly, building new resources or a new capability, and you also sort of need to have a totally different understanding of the customer value.*" – Interviewee A2

, and also stated that successfully converting requires companies to leverage on prior knowledge about their product(s): how it is manufactured, optimized, and used. It is important not to start doing something completely different, but rather balancing previous knowledge with new insights.

Explicitly concerning the automobile industry, four important resources/capabilities were mentioned as success factors: physical sales points, continuous development of service offers, communication, and modularization.

First, interviewees A3, A4, I1, I2, and I6 discussed the importance of physical sales points/showrooms. Especially Tesla's stores are brought up as a cause for the brand's success on the Chinese market (i.e. penetrating the market as a foreign brand).

> "*They [Tesla] don't sell through dealers, they've got their own stores. […] If you read on various forums, many talks about it like 'Oh, we've been to the 4S store and we did this and this…' and it feels like that's increasing their reputation.*" – Interviewee A3

Interviewee I6 developed on the topic and suggests that the trend towards vertically integrated distribution channels will have a large impact on the industry structure:

> "*[…] in the traditional side, it's the B2B and then B2C but in the new model side we just can say it is B2C.*" – Interviewee 6

Second, as cars generally have development times spanning over several years, it is also deemed important to efficiently identify and act on the customer insights to enable e.g. annual updates of the full solution. Interviewees I1, I2, I3, I4, and I5 thought this will be a capability becoming increasingly important within the automobile industry. Efficient communication with existing and potential customers is considered a powerful tool when (re)developing service offers:

> "*And that is maybe not primarily discussing what they need in the future, but rather asking about issues connected the car ownership today. Then it's up to us to figure out solutions. So, there we will, so to speak, use the customer base.*" – Interviewee I2

Something used to complement customer dialogues during the development phase are customer journeys, a visual tool to illustrate what different steps are involved in car ownership and thus simplify identification of issues to be solved. Furthermore, competitor scanning is also done and used for internal development:

> "*And we need to make decisions on whatever our competitors are doing.*" – Interviewee I4

Third, interviewees A4 and I7 mentioned modularization. Modularization has been used in the automobile industry for a long time. Especially in the assembling phase, where different parts can be used in different models. A modularization mindset, regarding both the product and

service parts of the solution, is thought to enable small changes without affecting the whole solution. This is thought to be increasingly important when customer value becomes more closely connected to the offered solution rather than the core product. Interviewee I7 also connected vehicle diagnosing and modularization capabilities to the new ownership model connected to servitization. When ownership is maintained, used cars will suddenly start returning:

> "*One thing that often becomes a topic of discussion is how to create something circular, when our current model sends off the products linearly. We only see the rear license plate when they [the cars] drive off. We never see them return.*" – Interviewee I7

Opportunities for recycling of various parts will most likely emerge as a result of this. Therefore, the importance of diagnosing and modularization competencies will grow for manufacturers.

Fourth, to overcome various anxieties and uncertainties concerning servitization and, to some extent, electrification, external communication is considered a key capability. Interviewees I3, I4, and I5 expressed opinions that questions regarding what is included need to be clear and stringently answered through several marketing channels, both traditional and new. Social media and influencers were considered important when new ownership models are to be diffused.

A need for an updated internal value chain is identified. Thus, the reevaluation of necessary assets and competencies suggested by (Chesbrough and Rosenbloom, 2002) is acknowledged. Increased capabilities connected to understanding customer value, a modularization mindset, and new distribution channels are considered important from both the researchers' and the industry representatives' points of view. The three-stage process to transform into a service offering company, presented Oliva and Kallenberg (2003), is thus to some extent followed, however a bit out of order. Based on their framework, the car industry should focus on analyzing and optimizing distribution channels and customer perception of services.

Most collected data on the necessary competencies topic relate to efficient customer interaction to enable continuous development of the service offer. Thus, without being explicitly mentioned, it can be argued that the overall goal is providing a perfect customer experience. Several of the actions/tools presented by Frow and Payne (2007) are either done or planned for. Understanding customer needs and preferences is identified as key. Extensive mapping of needs and preferences using customer journeys and customer dialogues is done. However, the expressed need for cross-functional internal integration is not mentioned. Thus, this might be considered an organizational issue affecting the level of customer value understanding negatively. Capabilities related to customer interactions will be somewhat further discussed in the next chapter in relation to changing network interactions and customer relationships.

The importance of clear communication is also recognized from the industry perspective, especially as servitization within the car industry is still in an emerging phase. As marketing channels are identified as a complementary by Teece (1986), a well-functioning marketing department could not only help encourage diffusion of the servitized mindset, but also the ongoing electrification.

4.6 Value Network

The four value network actors (customers, competitors, suppliers, and other third parties) described by Chesbrough and Rosenbloom (2002) were all acknowledged and reflected upon during the interviews. This section will describe a car manufacturer's position within the value network, and the characteristics of the relationships between the different actors.

All interviewees highlighted that offering services increases the intensity of the relationship between supplier and customer:

> "*Because I think the dialogue between the supplier of vehicles and the one operating vehicles will be on a totally different level than the dialogue we have with our customers today.*" – Interviewee I7

Further, Interviewee A1 suggested that continuous customer interaction can be used in a proactive way:

> "*If you always have this dialogue with the customer, you are the first one to know if the customer is unhappy and then you can proactively react by maybe offering another solution that makes the customer satisfied.*" – Interviewee A1

Interviewee A2 expressed that combined product-service solutions are often more complex than either one by itself. Therefore, sales cycle times may increase. More time is spent on understanding the customer and perhaps also customizing the solution. Thus, customer dialogue and interaction will play an increasing role. Interviewee I3 suggested that providing a product-service solution can facilitate this. The interaction level between supplier and customer will increase, primarily by an increased number of customer touch points. Starting from the first time a (potential) customer gets in touch with the brand, to the buying point, and then several either physical or digital touch points during the use phase will exist. Interviewees I1, I2, I3, I4, and I6 believed these touch points are potential dialogue opportunities where customer insights and behaviors can be mapped. Furthermore, Interviewee I3 argued that an increased number of customer touch points is said to increase customer loyalty:

> "*So, what do you do to create customer loyalty, to make sure you have several touch points with consumers? Continuously, it's by developing services.*" – Interviewee I3

Customer interactions can also be indirect, where brand building is done using taste makers and influencers (interviewees I3, I4, and I5). Their purpose is to increase awareness and attractiveness, while also functioning as an elongated arm to the market. Especially on the Chinese market this is deemed essential by foreign companies:

> "*China changes so fast, that we a as a company can have a finger on the pulse of how trends are changing. What is the new topic that people are talking about. I mean, like electromobility and smart cities is so ten years ago now, right. If we really want to be progressive as a company, we need to stay relevant in our communication and our development of services and so on. And that is by being in touch with these people.*" – Interviewee I3

Interviewee A4 argued that B2C industries have much to learn from B2B industries regarding customer interaction.

When converting to selling services, positions within an existing value network change. For example, interviewees A2, A3, and A4 identified a new set of competitors that consists of practically all forms of transportation. Interviewees I5 and I6 considered the EV competition on the Chinese market to be harsh. However, Interviewee I5 identified some openings:

> "*Yeah, I mean I think there is a lot of white space at more of the mid and upper ranges.*" – Interviewee I5

, but also states that domestic Chinese firms are developing new models fast and therefore this gap may soon be capitalized by them.

To fully benefit from servitization and shape attractive service offers, interviewees A2, A4, I1, and I2 believed the importance of integrating partners increases:

> "*I believe that they [partnerships] are a prerequisite for many companies, or for most companies, in the future. If you look at what's happening, more industries find that you can't have all competence in-house. You need to collaborate with others, who might be able to work […] more agile. Having shorter product development cycles and similar.*" – Interviewee A4

> "*You don't talk about that it's a supplier anymore. You talk about co-creation.*"- Interviewee A2

Existing advanced partnerships within the car industry are brought up. Interviewee A4 mentioned the one between Volvo Cars and Uber revolving around autonomous cars. Some problems with advanced partnerships were identified. Interviewee A2 believed answering the following questions become increasingly important: *Who is fronting the customer? Which brand is exposed?* Partnerships also increase interdependencies and thus also implies risk sharing.

Further, interviewees I1 and I2 deemed partnerships to be necessary to keep up with the market pace. Types of identified potential partner companies include charging infrastructure companies and various companies that can provide services directly to the product-service solution that can be distributed under the manufacturer's brand. Partnerships with companies offering a charging infrastructure could be particularly advantageous on the Chinese market, as only two thirds of EV owners have the possibility to charge at home. Risks of integrating partners were also identified, mainly concerning ensuring an even level of customer experience:

> "*So that we don't risk that they [some partners] do well and provide a positive customer experience, but it doesn't work at all in the neighbor country.*" – Interviewee I2

The Chinese government was identified as a crucial actor in the value network by interviewees A3 and I5. EV buyers receive large subsidies, e.g. a free license plate. This and other subsidies are mostly provided in large tier 1-2 cities. As a result of this, EV diffusion in smaller tier 3-4

cities is lower. The importance of what policies and laws the Chinese government passes is considered significant.

> "*It [the Chinese government's role] plays a lot. It sets a role and an agenda to hit within a particular year. And it sets an emotion, monetary and regulatory if that go in that direction. It restricts other behaviors that don't fit that model.*" – Interviewee I5

Both researchers and industry representatives emphasized that there will be a major change in the interaction between the car manufacturers and customers. As Meyer and Schwager (2007) argue, this is generally necessary once services become integrated in an offer. The increased level of interaction is not only seen as a necessity due to servitization, but also as a way to further develop service offers and by doing this increase both customer value and customer experience. However, taking advantage of these opportunities is hard, succeeding requires communication between supplier and customer, and sometimes also instructions (Frow and Payne, 2007). Increased number of customer touch points, especially during the use phase, is by the industry thought to be useful to create a continuous customer dialogue. Physical sales points/showroom will be used early on in the relationship life cycle, whereas several later customer touch points may be digital. This suggests that not all customer touch points are handled equally, and that extensive assistance is provided early on in the life cycle. The importance of this is highlighted by both Vandermerwe and Rada (1988), and Frow and Payne (2007).

The views on the competitive landscape differs between researchers and industry representatives. Both agree that competition is harsh, but researchers see that future competition consists not only of car manufacturers. As servitization within the car industry develops, focus will shift towards functionality rather than revolve around the cars. The rapid growth and development of the Chinese EV market described in the desktop research is recognized by the industry.

To successfully meet the changing market needs, the increasing importance of integrating partners is brought up by both interviewee categories. This reason is noted by Vandermerwe and Rada (1988). Integrating partners to succeed, particularly on the high-paced developing Chinese EV market, may be promising strategy based on arguments brought forward by Powell (1990) and Henneberg et al. (2013). Different (potential) partnerships are identified. As defined by Granovetter (1973), these can be either strong or weak, but indications on whether the different bonds are equally strong are not provided in the gathered data.

Furthermore, as other actors' solutions are to be incorporated in the full solution offer and being part of the customer experience, the risk of being blamed for a partner's mistake, presented by Henneberg et al. (2013), becomes evident. Therefore, a car manufacturer with a servitized offer must be ready to act on their partners' failures (Tax et al., 2011). While there exist obvious benefits of engaging in various partnerships as a car manufacturer, the relations within the value network will change and give rise to new problems.

As the Chinese government is considered the most significant third part actor of the value network, it and its (future) decisions should be carefully monitored and analyzed to facilitate the strategic positioning in the value network mentioned by Chesbrough and Rosenbloom (2002). Public subsidies as a mean for EV diffusion is also mentioned by Wang et al. (2017). The industry has also identified partnerships with various taste makers and influencers as key

to increase adoption. These partnerships are well aligned to arguments brought forward by several scholars on the topic of innovation diffusion (Leonard-Barton, 1985; Rogers, 2003; Zhang et al., 2015), where they are labeled as either innovators or opinion leaders. As argued by Rogers (2003), they may play a significant role in attracting the majority of the market, both regarding both the EV technology and servitization within the automotive industry.

4.7 Cost Structure and Profit Potential

Different business models implicate different potential revenue streams and costs (Chesbrough and Rosenbloom, 2002). Converting to a servitized offer will have some implications regarding costs and revenue streams. The initial price is no longer an important aspect, as payments are more often done continuously, and cash flows become more evenly spread (interviewees A1, A2, and I1). Instead, focus is usually turned towards a total life cycle cost. Interviewee A1 argued that today's servitized markets are B2B markets and that customers within them are generally more aware of total life cycle costs than those within B2C markets. Interviewee A1 also emphasized that suppliers prefer customers to use units for a long period of time, over a situation where customers return to buy new units. Interviewees A2, I1, and I3 suggested that the absence of a large initial investment, and instead small continuous payments, can be an enabler for car sales as the customers may perceive it as cheaper, and continues by saying that servitization shifts focus from high margins towards large volumes.

Furthermore, Interviewee A2 mentioned how the new cash flow pattern affects the impact of the overall economic climate. Whereas, traditionally, a good economic climate generally implies high product sales and bad economic climate leads to higher aftermarket sales (e.g. spare parts and service) for manufacturing firms, servitization erases these differences.

Interviewee I1 argued that there exist several uncertainties regarding pricing strategies connected to servitized offers within the car industry. The main questions relate to how the services are perceived by customers and how they are translated in monetary terms. Previously, pricing has to a large extent been dependent on manufacturing cost and an added margin. However, Interviewee I2 argued that one already identified component of a pricing model is using on demand services, i.e. services that are not part of the standard offer, but rather paid for separately. Furthermore, Interviewee I2 continued, a strategic overall approach to pricing and costs is considered. Instead of making every service yield a positive return, the total profitability is considered:

> "*I believe that profitability comes in the full-service offer. I mean that we charge a high price for a good product and a fantastic service-offer comes along.*" – Interviewee I2

The shift of ownership was discussed by interviewees A1 and A4, who argued that it must be kept in mind when designing a servitized business model. One example relating to the automobile industry is provided:

> "*I will also try to avoid lots of service and maintenance because those will be costs for me. Thus, they turn from generating revenue to becoming costs.*" – Interviewee A1

Interviewee I7 discussed pricing strategies as a mean for diffusion and argued that targeted pricing for specific markets can be a successful strategy:

> "*How do people pay in London today? And then you create a solution that fits those preferences, and then you are set on that market. But it might not work at all on Manhattan, or in Paris, or somewhere else.*" – Interviewee I7

Converting from a product- to a service-centric car manufacturer will have implications both on the cost and revenue structure. Baines et al. (2009) mention financial drivers as one of the reasons for servitization, and different pricing strategies have different implications on cash flows (Ritter and Lettl, 2018). Further, the car industry has long product life cycles, another argument to why servitization can be considered a successful tool (Gadiesh and Gilberg, 1998; Wise and Bamugarter, 1999). A servitized offer will even out cash flows in the EV industry, compared to one-off sales. The interviews show that pursuing a pricing strategy revolving around small continuous payments is thought to increase the adoption of EVs. As suggested by the study conducted by Lin and Wu (2018), Chinese automobile consumers are sensitive to the purchasing price when it comes to EVs, suggesting this strategy would be suitable on the Chinese EV market.

To create flexibility in the offer, industry representatives also mention on-demand-services that can be explicitly paid for. Chesbrough and Rosenbloom (2002) argues that manufacturing companies will gain insights on revenue structure simultaneously with diffusion among different market segments. For example, one identified problem concerning the pricing is how offered services should be priced as the market is relatively undeveloped and customer opinions are not yet fully mapped. Baan et al. (2017) however show that there are indications that Chinese automobile consumers are willing to pay extra for additional connected services.

In line with arguments brought forward by several scholars, risk and responsibility will affect in- and outgoing cash flows (Oliva and Kallenberg, 2003; Sawhney, 2006; Gaiardelli et al., 2014). From previously generating revenue, service and maintenance will become a cost to the manufacturers. Focusing on the total life cycle cost is considered key both based on interview data and in studied literature (Cherubini et al., 2015; Rabetino et al., 2015). Opinions that a full-service offer is what will drive profitability is brought forward during the interviews, even though not all components necessarily have to be profitable. Taking a full-solution perspective is necessary to avoid situations where the business model and profitability are not aligned. This in combination with development towards a PSS can be seen as tools to maximize customer value (Müller et al., 2009; Baines and Lightfoot, 2013).

The arguments regarding a targeted pricing strategy based on different (geographic) customer segments found during the interview can be strengthened with help from the literature study. As Moore (2006) argues, targeting a small niche market is key when the goal is technology adoption. A customized pricing strategy could thus be very much part of gaining market leadership on a small niche market.

4.8 Competitive Strategy

The competitive strategy element describes how companies position themselves on the market and differentiate themselves from their competitors (Chesbrough and Rosenbloom, 2002). This section explains the competitive rationale behind servitization and how servitization relates to the market positioning and can be used to differentiate offers.

When changing the competitive strategy, Interviewee A2 argued that companies need to create alignment throughout the entire business. Interviewee A2 further explained that the underlying drivers to why companies choose to servitize can differ from case to case. Both manufacturers and consumers appear to have an impact on the shift towards servitization and benefits for both actors can be identified. Interviewee A1 described a scenario where car manufacturers of today have to teach consumers new behaviors to change their view on car ownership.

Interviews with interviewees A1, I1, and I4 showed that the market positioning is strongly connected to a company's core values. Interviewee I4 stressed that company values are defined to guide the development of the offer as well as marketing efforts. This was followed by the notion that the attributes of products and services should mirror a company's values and be clearly communicated to the potential customers. Interviewees I3 and I4 pointed out that the choice of competitive strategy is highly influenced by both internal and external factors as companies tries to communicate and teach consumer their values while adapting to the market demands.

> "*One tries to stretch oneself to create an experience rather, or a soft value, rather than a hard value. Then it will probably move backwards a bit. And it is always so that one pushes things to the extreme before one finds the balance where both the company and a customer group, or whatever it may be, especially the society, in this perspective, find each other...*" – Interviewee I1

New technologies have allowed car manufacturers to provide new types of offers which they are now trying to push onto the market. However, new types of customer needs were mentioned by Interviewee A2 as another driver of servitization. According to interviewees A2 and I1 servitization can be viewed as one possible way of improving the competitive strategy by focusing on softer values more closely connected to customer needs. In the context of EVs, a service-based competitive strategy is according to Interviewee I4 viewed as a way for companies to differentiate themselves from their competitors. Previously, the EV technology itself could create a competitive edge. However, today EVs are becoming more of a commodity and companies are therefore forced to innovate their competitive strategies to differentiate themselves on the market. The choice of competitive strategy is closely related to the target segment. However, according to Interviewee I5 it is not enough for a company to identify their consumers. They also need to define how to position themselves within this segment. Services are brought forward as a way of achieving this. Using services as a solution was mentioned by Interviewee I2 to be a way for manufacturers to deal with the consumer anxieties which are still connected to EVs. Interviewee I3 however argued that services by themselves are no longer sufficient to differentiate an offer due to its commodity on today's market.

> "*So, it is a combination of companies seeing that they can make money on a new business model, that technology makes it possible, and that customer behavior changes because people are living more compact and urbanized.*" – Interviewee A1

Some other identified ways for manufacturers to differentiate themselves are through pricing, company values and focus (e.g. sustainability, technology) (Interviewee I5), technology offered in the product (interviewees I1 and I2), level of service focus (Interviewee A2), and customer privileges (Interviewee A3). Per Interviewee A3 one way of providing customer privileges in

China is to give customers some type of loyalty bonus as a reward for using a service. This way companies can capture the mass and win majority on the market.

By servitizing an offer, Interviewee A2 argued that suppliers get closer to the customers and become more aware of their needs. Thus, this type of strategy supports more customized solutions and offers towards customers. According to Interviewee A1 it also changes the competitive environment as manufacturers no longer have to compete with sales of used vehicles. Simultaneously, Interviewee A4 mentioned that the consumers are relieved of the risk of depreciation which is connected to the uncertainty of the EV second-hand market. Interviewee A2 argued that a service-based strategy can also be a measure to reduce the risk of competitors imitating an offer. Furthermore, switching to services can according to Interviewee I4 be a part of a branding strategy.

There is a financial rationale behind servitization of a business model. In many cases it is according to Interviewee A2 easier for companies to get higher margins on the sales of services. On the other hand, as noted in chapter 4.7, Interviewee I1 suggested that servitization may shift the financial focus from high margins to high volumes. Interviewee A1 argued that servitizing the offer can help changing to a product life cycle focus. Instead of just selling a product once with a certain profit, companies choose to focus on lowering the cost of delivering the product and then to focus on creating as high a reward as possible during the product life cycle. For the customers the service rationale, per Interviewee A2, often means that costs will be spread out more evenly during the product life cycle. Interviewee A2 explained that for some companies this is a way of avoiding the price discussion and focus on offering their customers a valuable solution. Interviewee I1 explained that the car can be used as an enabler to sell additional services. According to Interviewee A1 this provides manufacturers with a way to generate more revenues.

> "*In fact, what it is all about, it is that […] a smaller amount of resources satisfies a larger demand. And that means that a smaller amount of money satisfies a larger demand. The increased payment capacity per utility, it reduces the risk for both sides.*" – Interviewee A1

Company values are found to be closely related to other parts of the business model such as the value proposition, the choice of market segment, and internal competencies, i.e. the value chain. The last part in particular complies with Chesbrough and Rosenbloom's (2002) definition of the competitive strategy and its utilization. As consumer demand is one of the drivers of servitized business models the characteristics of the target segment will have an apparent impact on the competitive strategy. However, the study provides different views on which part is shaped first. While authors such as Oliva and Kallenberg (2003) argue that customer demand is a driver of servitized thinking, the empirical study show that companies choose their target segment based on internal values. This signals an exchange between the competitive strategy and the market segmenting and positioning. In the case of China, a certain resistance towards fully servitized offers has been identified. It is thus up to the manufacturers to push servitized business models. However, it is also stressed that characteristics and values of the segment must be taken into consideration. As noted by Wang et al. (2017), a lot of actors are implementing servitized thinking in their business models. This implies that companies should not only compete with a servitization strategy but also focus on differentiating themselves further within this segment.

Integrating services to gain competitive advantage has been repeatedly argued for. Financial factors, customer demand, and competitive elements are three arguments brought up by Oliva and Kallenberg (2003). All these rationales were described during the interviews as well, showing that companies have several reasons to integrate services in their offers. It is seen that a competitive strategy based on services can differ significantly from case to case. Some companies choose to only provide services, such as leasing agreements, car sharing platforms, or other transportation services, while other suppliers focus on selling a car and then additional services that occur after the initial purchase of a car. Through differentiation (Heskett et al., 1997) and customization (Vandermerwe and Rada, 1988) a company can distinguish itself from its competitors. According to Mont (2002) service-based strategies such as PSSs increases flexibility and creates opportunities for customization.

According to the result, a common rationale for servitization is the impact on customer relationships. As companies provide more services they get closer to the customers and can thus create a better understanding of their needs. This could be viewed as significantly important on the Chinese market as customer preferences related to EVs vary between and within the segments. A similar argument is given by Miroudot and Cadestin (2017) saying that servitization leads to long-term customer relationships and can thereby improve the customer experience.

A drawback related to a service-based strategy, as argued by Sampson and Froehle (2007), is that it makes it harder to keep secret from competitors. Such a strategy would thus be less efficient for companies trying to differentiate themselves on the market. However, the results indicate that service offers would normally be harder to imitate. This means that even though it is harder to keep secrets from competitors it is hard for competitors to replicate the system needed to deliver services. As previously described, servitization in general leads to closer customer relationships thus shifting some of the focus towards the exchange between the supplier and the customer making the offer itself less important. This means that even though another actor would copy the offer, the supplier-customer relationship itself could not easily be copied as it is built over time.

The financial reasoning for servitizing the competitive strategy is presented both in the literature review and the empirical study as a result of the opportunity for companies to generate more income from an already installed base. This is something that is becoming extremely important in the automotive industry due to low sales profitability on passenger cars (Supplier Business, 2009) and emerging environmental trends (Mahut et al., 2017). As expressed during the interviews, the service strategy implies a life cycle thinking where the economies of both suppliers and consumers are impacted. Increased focus on services leads to a higher dependency (Miroudot and Cadestin, 2017) and thereby a mutual dependency to create profitability for both parts. Helveston et al. (2015) argue that Chinese EV consumers are sensitive to operating costs. Through closer relationship it is possible for manufacturers to help their customers calculate and control their operating costs. Furthermore, consumers will not have to worry about initial costs, which are normally a drawback related to EVs, and various unexpected costs related to the car whiles the suppliers can rely on steady revenues and potential revenues from additional services.

Interviewee A2 and previous studies (Anderson et al., 1997; The Economist, 2000) argue that services generally yield higher margins than products. The same is argued for in the context of the automobile industry in which the profitability of the car itself is low while after sales services have showed the potential to increase profits. However, Interviewee I1 instead argues

that servitization shifts the focus from high margins to higher volumes. This could be viewed as contradictory, but it could also be argued that both statements are true since a shift towards service sales indicates more possible options and continued spending from the customer. The sales volume would thus increase even though the value of each purchase would be significantly lower than if the customer bought an entire car. Servitization could thus be argued to increase both the volumes and the margins.

5 Discussion

In this chapter, the study's three research questions are discussed at a general level based on the previous chapter, however with a more speculative approach. This lays the foundation to the final conclusions.

5.1 What are the main characteristics of servitized business models?

The analysis highlights the impact of services on the different components of the business model and thereby what characterizes a servitized business model. It is evident that the value proposition is highly impacted by service integration as consumers are offered additional value through services. In a servitized offer a focus is shifted towards the customers' processes and problems, and how solutions related to them can be sold. In the case of the automobile industry, focus is shifted from selling a car to finding solutions to customers' transportation needs. The servitized value proposition is also characterized by the product-service continuum, which describes the level of service integration.

The market component appears to stay rather unaffected by servitization. However, it is implied that manufacturers might have to find new customers when servitizing the offer, as not all consumers value services equally high. One potential target segment mentioned in this study is the 'do it for them type', whose customers prefer that their processes are handled by someone else.

For the value chain, competencies related to understanding of customer values, modularization, and extended distribution channels are highlighted as increasingly important when servitizing the business model. In the automobile industry, manufacturers should thus focus on analyzing and optimizing distribution and customer perception of services. Furthermore, communication is described as important to create a consistent view of the product-service offer.

It is revealed that several attributes of the value network component are impacted by service integration. It is clear that the relation to customers will change significantly due to the increased need for customer inputs and interaction. In general, relationships become more intense and long-term. As a result, several new customer touch points have to be developed. The competitive landscape is also impacted as manufacturers are no longer competing against other product providers but also against service providers. The partnership structure will also change as the need to find partners within the service segment increase.

The most significant impact on the profit potential is the change of revenue streams. In a servitized business model, revenues are continuous, meaning that cash flows are evened out. It is also notable that the cost structure is changing when ownership is shifted towards the provider. In the case where the manufacturer retain ownership, previous revenue generators, such as maintenance, will become a cost for the manufacturer. Such risks will thus have to be accounted for in the pricing model. However, as this study has taken a strategic approach to the servitization concept, detailed financial implications of servitization have been neither found nor sought for.

It has been shown that servitization is highly driven by customer demands thus the target segment will impact the competitive strategy. Several competitive advantages are connected to a servitized business model where some of the most important, in accordance with the results, seem to be flexibility and the possibility to customize. This means that an increased number of customer needs can be satisfied. It is also seen that the increased customer interaction implied by servitized business models can be leveraged by manufacturers to create a competitive advantage. Furthermore, this leads to a strategy based on life cycle thinking, impacting the economies of both the suppler and the customer.

The study further reveals some general insights on servitized business models that are chosen to be highlighted. There are several rationales for converting to a servitized business model. Successfully committing to a servitized business model is, however, connected to new challenges for previously product-centric companies. A holistic approach to the product-service continuum must be considered. *What services are relevant? How much integration between product and services is optimal?* are questions, among others, that become relevant once a servitized business model is pursued. Answers are seldom obvious and depend on various contextual factors, e.g. customer preferences and underlying technology. Therefore, an increased customer interaction process has been identified as one of the most important components of a servitized business model. This is highlighted both in the theoretical study, e.g. Vandermerwe and Rada (1988) and Sampson and Froehle (2006), and in the results of the conducted empirical study.

Increased interaction with (potential) customers essentially boils down to an increased number of customer touch points, often spread over the whole relationship. These mainly serve two purposes: increased customer loyalty, and possibilities to gain and act on customer inputs. More customer touch points lead to a closer bond between supplier and customer. Thus, servitization can be used to increase customer loyalty and create a solid customer base where the actors engage in business for a long time. The customer touch points are also seen as excellent possibilities for dialogue regarding needs and preferences. Effectively acting on these insights provides opportunities for relevant and quick responses to said needs and preferences. In emerging markets, where customer needs and preferences are yet to be well defined, efficient response is crucial. Therefore, one could argue that servitization ads even more value, to both suppliers and customers, in rapidly growing markets. Similar points are also made by Bustinza et al. (2015). Being the first to act aligned to customer needs on an emerging market may be a successful strategy when aiming for market penetration.

Reacting quickly the changing market needs can also be done using partnerships. When attaching various services to the core product, companies enable themselves to benefit on others' knowledge. Whether or not partnerships are more common in servitized business models than in product-oriented, is a question not posed by this study. It is evident however that partnerships play a major role in servitized business models. Especially aiming for differentiation, one could argue that it is easier to add another actor's functionality as a service than integrating it in the product design. A question regarding who is fronting the customer is then likely to emerge. In a car industry perspective, previous partnerships could perhaps be likened to close supplier partnerships. Car manufacturers are of course dependent on a great number of suppliers, and ongoing relationships with suppliers have arguably developed into partnerships. However, these have seldom been visible to the common customer. But they will in a servitized offer. Integration of e.g. maintenance and various charging solutions in the value proposition will expose customers to other actors to a much higher extent (of course assuming not all services are offered via vertically integrated channels). Implications of this are not

elaborated upon in this study, as specific partnerships are not mapped. Nevertheless, other risks of partnerships are highlighted. Especially issues concerning blame and responsibility, also discussed by Tax et al. (2011) and Henneberg et al. (2013). Furthermore, partnerships will raise questions regarding profit and risk allocation. *Who gets what and who pays for costs related to delivery problems in the partnership?* These financial issues are, however, deemed out of scope of this study as it does not aim to investigate specific partnerships.

5.2 What are the main obstacles when implementing a servitized business model?

Many advantages and opportunities have been described in relation to servitization. However, several obstacles, both internal and external, are facing companies who are trying to implement a servitized business model.

Choosing a servitized business model requires a development of internal competencies which differs from the ones used in a product-centric business model. The results indicate that servitization leads to a redefinition of customer values and therefore suggest that internal competencies need to be adapted to a new way of creating value. This can be an issue for companies which traditionally have focused solely on capabilities related to the product itself. It appears that companies need to redefine their own internal values to align themselves with the consumers. As argued by Frow and Payne (2007), and brought up during the interviews, it is important for a manufacturer to develop cross-functionality and to promote the same brand value through all communication channels. This task becomes even harder for a servitized manufacturer as both the product and the integrated services must be perceived in the same way to create a consistent message towards the customers. Implementation of PSSs could arguably be one way for manufacturers to handle this problem as it promotes simultaneous development of products and services.

One of the arguments for servitization is the fact that development times generally are shorter for services than for products, which implies more agile response to customer demands. However, this also means that product development and service development will not occur at the same pace. This does not necessarily have to be a problem but in the context of a PSS, as described by Müller et al. (2009), products and services should be integrated already in the planning phase to create more synergies. Even if new services could be developed at a faster pace, the initial product design must take future service development into consideration. This creates a problem for automotive manufacturers as the product development cycles are relatively long and new physical features can be hard to integrate in a late development phase. The initial product design thus sets the limit for future service development. One such example are various connected services, e.g. remote climate control or digital keys, which are dependent on physically built in features in the car. Manufacturers are thus required to foresee future service updates already in an early product design phase, which could be considered very hard as customer demand is rapidly changing.

As argued in previous studies (Vandermerwe and Rada, 1988; Miroudot and Cadestin, 2017) and in the interviews, a servitized business model will change the role of customer relationships as they become closer and more long-term. An increased focus on customer needs requires a higher level of flexibility and customization and thus an increased investment in the relationship. A lot of the studies made on servitization are focused on B2B relationships in which the manufacturer's customer base is normally much smaller than for a company

operating in a B2C context, i.e. private car suppliers. Balancing the intensity and cost of each relationship with the offered flexibility can thus become a problem for car manufacturers who choose to servitize their offer. Close long-term relationships will also require new customer touch points to be developed as to be able to better answer to customer feedback and varying demands.

A recurring theme when studying servitization is an increased focus on handling customers' processes rather than providing them a product (Stremersch et al., 2001; Oliva and Kallenberg, 2003). In the automotive industry this is partly driven by the consumers themselves but also by the manufacturers, who need to find new ways of appropriating from an already installed base of vehicles. However, for some consumers the value is still strongly tied to the ownership of a vehicle. This means that said consumers will consider a fully service-based offer as a loss of value. Manufacturers thus need to find ways to either locate the consumers who appreciate the value of services or to convince sceptics that there is a value in services. When studying the Chinese private car market, there is still a resistance towards service-based offers. As indicated by the findings, cars are to some extent considered as status symbols. Car manufacturers thus either need to find ways to convert the view on car ownership or find the segments which are less interested in owning a car.

5.3 How can a servitized business model facilitate EV adoption on the Chinese automobile market?

Chesbrough and Rosenbloom (2002) defines a company's business model as a mediator between technical inputs and economical outputs. This study adopts the notion that a business model can be used as a tool for companies to overcome obstacles related to the commercialization of a certain technology. Technology shifts, such as electrification, are not uncommon and are often related to some general characteristics and implies consumer anxieties, a new competitive landscape, and a need for companies to review their business models.

China is the world's largest EV market and could thus be seen as a leader in EV adoption. However, EVs only constitute approximately 3 percent of today's total private car market in China, per EV-Volumes (2018). A growth is however forecasted, and new business models are seen as one of the means to facilitate further adoption. One can already see a shift in trends on the Chinese private car market as several actors are developing new innovative business models and old values related to car ownership is being challenged by younger generations of consumers. Chinese consumer behavior is also described as very heterogeneous and the market climate as quickly changing. Manufacturers thus have to find new ways of customizing offers and adapting to new emerging customer needs. Based on this study servitization is seen as one potential way of doing this as it provides manufacturers with better customer insights and ability to adapt and shape new types of offers.

This study, as well as previous studies, show that, due to technological restrictions and a nascent customer base, the EV adoption is still relatively small in China and the rest of the world. Battery technology is one of the main obstacles that manufacturers face as today's batteries are expensive and therefore leads to high initial costs for the consumers. It is argued that, from a lifetime perspective, EVs can be the cheaper alternative since EVs are characterized by low operating costs due to lower fuel and maintenance costs (Dijk, et al., 2013). It is however hard to say if and when customers will profit from investing in an EV since the market is nascent

and not enough studies have been conducted on the subject. Through servitization suppliers can overcome the issue of high initial costs by developing full service offers, e.g. leasing agreements, subscription models, or car pools. This way consumers can spread the costs over a period of time, thus lowering the barrier for adoption.

Chinese consumers are showing sensitivity towards operating costs (Helveston et al., 2015). Even though EVs lower the operating costs there is still the issue of cost inconsistency as sudden damage can incur unexpected costs. Also, new batteries are still fairly expensive. A closer relationship between supplier and customer facilitates services, such as embedded communication services and tracking, where the manufacturer can help their customers control in-use costs. Furthermore, a service agreement that fully transfers responsibility to the manufacturer could entirely remove the uncertainty and risk of unexpected costs for the customer. However, this would probably lead to somewhat higher regular costs for the customer. It is however notable that other studies, e.g. (Lin and Wu, 2018), argue that usage cost have no significant role in the purchasing decision. This further strengthen the notion that it is hard to make general assumptions about the Chinese market and that manufacturers thoroughly need to investigate their potential target segments.

Electrification have implications on charging as there is no widespread existing infrastructure for battery charging. This is a huge issue for EV manufacturers as customers are reluctant to adopt EVs as long as the charging insecurity remains. When studying China, it becomes evident that the majority of existing EV consumers are located in the big cities, indicating shorter traveling distances and therefore reduce the importance of battery range. However, previous studies still show that this is viewed as an issue amongst consumers and, according to Baan et al. (2017), only two thirds of EV owners in China have the possibility to charge at home. Suppliers can somewhat overcome this issue by offering services that include access to dedicated charging stations. To be able to do this, manufacturers might have to develop their own infrastructure, which is very expensive, or engage in partnerships with e.g. an electricity provider.

Even though cars are mostly utilized in urban environments, there is an argument that people want to have the possibility to travel longer distances. This is implied by the customer skepticism related to range which is described by Baan et al. (2017) and Olson (2018). Due to battery technology and charging infrastructure, EVs are not optimal for long distance transportation. The interviews also reveal that Chinese consumers consider other modes of transportation such as high-speed trains and airplanes to be more attractive for long distance travels. If an EV, however, is integrated in a multimodal system it could be a part of a more sustainable traveling solution where consumers can use the car for shorter transportation distances before and after using another mode. In this case a service offer facilitates integration with other solutions, thus broadening the scope of the car manufacturers potential offer.

Not all services solve a specific problem. Some services instead provide consumers with some type of additional value or experience. During the interviews these services were expressed as ‘delights’, in contrast to the ‘must haves’ which are considered as a necessity in the offer. This indicates that all services included in an offer does not have to be directly related to a specific issue but could instead be used to create unexpected value. By providing new types of experiences manufacturers can draw attention from the downsides of EVs. New types of connected services are one example which, according to the study by Baan et al. (2017), is highly appreciated amongst Chinese consumers. These types of services are not related to the

performance of the car but provide manufacturers with an opportunity to distract customers from the drawbacks connected to EVs.

6 Concluding Thoughts

This chapter concludes what impacts servitization have on business model in general, and in a Chinese EV market context in particular. Further, managerial implications are presented, followed by a brief discussion of academic contribution and proposed future research.

6.1 The Impact of Servitized Business Models on the Adoption of EVs on the Chinese Market

The purpose of the study was to investigate whether a servitized business model could be used to facilitate adoption of EVs on the Chinese automobile market. By studying characteristics of the technology and the market, attributes of a servitized business model central for technology adoption were identified.

This study shows that the automobile industry in China is rapidly changing due to new technological trends and varying customer demands. This encourages manufacturers to implement new innovative business models. It is found that a shift to EVs lead to customer anxieties related to the battery technology and range, charging infrastructure, and operating costs. It is also indicated that the market climate is changing as technology improves and new offers are developed. The Chinese market is also impacted by ongoing changes of private economy, household structures, and living locations.

Servitized business models shift the focus from the product to the customers' values and experienced problems. As a result, manufacturers are developing internal competencies that are more focused on the customers processes. The characteristics of servitized business models imply several benefits when facing a technology shift. Due to shorter development cycles, services improve the ability to respond to changing customer demands, compared to when solely offering a product. One identified enabler for quick and relevant service development is partnerships with other companies. Partnerships provide access to others' knowledge and competencies, but also increase the risk of being affected by mistakes made by the partners.

Further, services facilitate increased modularization and customization towards customers. Service offers also lead to closer customer relationships which improves consumer insights and the possibility to respond to the actual customer demand. This means that servitized business models are more likely to help manufacturers understand the issues related to a new technology and give them the means to react to them instantly and with a certain level of customization. Reactions can include additional supportive services or removed initial cost barriers for customers. Servitization can thus be seen as a measure to facilitate adoption of electric vehicles on the Chinese automobile market.

6.2 Managerial Implications

Based on the results it is found that a servitized offer could be efficient to increase the adoption of electric cars. When studying the impact of service integration on the business model several distinguishing attributes are observed, such as increased focus on customers' values and problems, modularization and customization, closer customer relationships, shorter

development cycles, risk sharing, and cost restructuring. Manufacturers could benefit from considering these attributes when developing new offers.

Studies show that the brand loyalty is rather low on the Chinese car market. This, together with the fact that a lot of new actors are emerging, increases the need to develop good customer relationships and have continuous contact even after the point of sales. Vandermerwe and Rada (1988) for an example argue that services could be used as a mean to create customer loyalty. This could be done through physical services but also through digital communication and rewards to loyal customers.

As the Chinese market is described as rapidly changing and hard to generalize, the ability to modularize and customize offers could be considered as highly important. By offering various add-on services manufacturers can solve more customers' problems and thereby increasing the target market. To satisfy an increased service needs, manufacturers are however required to develop new capabilities related to the customer interaction. Especially after sales touch points will become increasingly important when integrating services as the manufacturers responsibilities will, even after the initial purchase, be higher than for traditional business models.

Further, the market for EVs in general could be described as nascent as battery technology and charging infrastructures are being continuously developed. On the Chinese market several new actors are emerging with new and innovative business models. This requires manufacturers to be able to quickly adapt to a rapidly changing market climate. Embracing services, which have significantly shorter development times than the cars themselves, increases the capability to adapt fast to new circumstances.

Reports presented in this study show that consumers in China in general are, in comparison to consumers on other markets, relatively concerned about the operating costs. However, the consumers are rather unaware of the potential cost savings related to electric vehicles. It is therefore necessary to create clear communication of the potential benefits. Also, since the second-hand market for cars is still a relatively small part of the entire automobile market in China, and the second-hand market for electric cars in general is relatively unknown, manufacturers could leverage the fact that a subscription offer would rid customers of issues related to selling the car on the second-hand market.

6.3 Contribution and Future Research

This study has provided insights on how servitization affects manufacturers' business models. The study describes and explains implications on each of the six business model components provided by Chesbrough and Rosenbloom (2002). Further, it relates these insights to the context of electric car manufacturers operating on the nascent Chinese market. Servitization is found to be one possible strategy when commercializing a new technology.

Furthermore, the majority of the studied literature describes servitization in a B2B context. Applying it to a B2C context, such as the car industry, may therefore be somewhat problematic. What is applicable and what is not? One large characteristic of B2B industries that affects servitized business models is the level of interaction between supplier and customer. Based on this study, the increased need is identified. Mitigating actions are identified, e.g. increased number of customer touch points throughout the usage life cycle. Further, as mentioned in the conducted interviews, the car industry is considered interesting from a servitization research

perspective as the underlying technology/product is relatively expensive. Usage life cycles also generally span over several years, a characteristic also found among several B2B industries where servitization is evident. Thus, this study contributes to the academic field of servitization in a B2C context.

While the study is taking a somewhat holistic view, studying the entire business model, several examples of servitized offers have been touched upon throughout the report. However, no thorough investigation of the current offers on the market has been conducted. It would thus be of interest to further investigate the value propositions of different actors on the Chinese EV market and their potential success factors. One could from the value perspective then investigate how the other components of the business model would be impacted by the choice of a certain value proposition. It would also be of interest to zoom in on the different identified demographical segments, e.g. high income, family size, and place of living, to see what characterizes each segment when it comes to EV adoption. No such studies were found during the course of this study. Furthermore, no distinction between different car segments were made in this study. One could argue that different types of cars, e.g. luxury models, SUVs, and sedans would attract different customers and require different types of services. Further research about the specific requirements for each model and their related customers and characteristics could thus benefit EV manufacturers.

Since the EV adoption in China, as expressed both during interviews and in previous studies, is highly dependent on governmental regulations one can argue that it is hard to make any definitive statements about consumers' willingness to adopt EVs without the presence of governmental incentives. One suggested way of studying this subject is to compare adoption of EVs in same tier cities with different levels of incentives.

Throughout the study, technology has been described as an enabler for services. Therefore, further research on the impact of different technologies surrounding the automobile industry is highly motivated. As the charging infrastructure is one of the main challenges facing EV manufacturers today, many would benefit from a higher understanding of future solutions in regard to this matter. An extended study on possible outcomes for the charging infrastructure and the impact these will have on EV manufacturers could thus be of interest. Another trend in the automobile industry of today, which was deemed outside of the scope in this study, is autonomous cars. This trend is evident from discussions during the interviews as well as from existing reports. Since this trend is found to be increasingly important within the automobile industry, further studies could focus on what implications autonomous technology have on servitized business models and EVs.

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Appendix A: Codes

SERVITIZATION
Characteristics of servitized markets
Reasons for servitization
Examples of servitization in industry
Servitization in the automotive industry

VALUE PROPOSITION
What to include in the offer
Consumers main issues
Service as a value proposition
Product-service bundling/Solutions

MARKET
Customer segments/Characteristics
Choice of segment
Architecture of revenues
Characteristics of Chinese market
Characteristics of EV market
Market maturity
Consumer preferences
Consumer anxieties

VALUE CHAIN
Internal activities
Internal competencies
Marketing channels
Distribution
Organizational structure
Tools

COST STRUCTURE & PROFIT POTENTIAL
Supplier cost structures
Customer cost structures
Revenue structure
Pricing strategies
TCO

VALUE NETWORK
Customer relationships
Customer relationships in service systems
Customer touch points
Competitors
Types of partnerships
Partnership risks
Third parties of interest

COMPETITIVE STRATEGY
Philosophy
Differentiation
Corporate strategy
Market positioning
Rationale for servitizing