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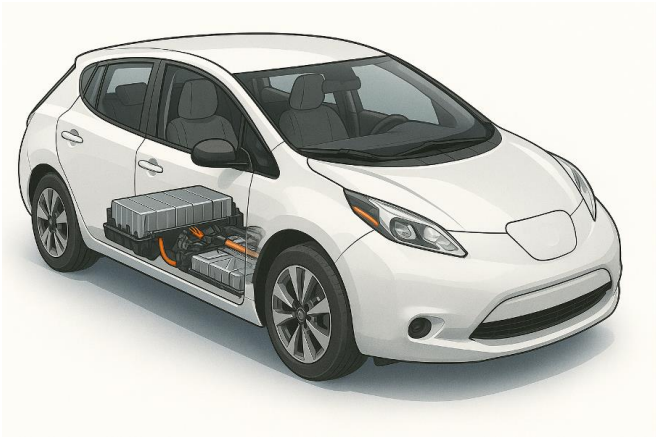

Business Model Innovation in the Automotive Aftermarket: Implications of the Transition to Electric Vehicles

A case study at an Automotive Manufacturer

Master's thesis in Management and Economics of Innovation

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Cover:
A Battery Electric Vehicle

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SUMMARY
With the automotive industry's transition from internal combustion engine (ICE) vehicles to battery electric vehicles (BEVs) several areas of the business model for original equipment manufacturers (OEMs) will change, one of these areas is the aftermarket. Where BEVs incur a drop in demand for current aftermarket products and services, such as spare parts and maintenance, compared with ICE vehicles.

This master's thesis investigates which challenges and opportunities are related to the transition from ICE vehicles to BEVs from an OEM's perspective. This study used a qualitative single-case study, using semi-structured interviews with employees from an OEM in the midst of such a transition. These interviews make up the data used for analysis. From the interviews, five specific key challenges the OEM is experiencing were presented: adaptation and change in existing aftermarket business model, new challenges and strategy related to the remanufacturing of battery, capturing residual value for end-of-life batteries, logistics challenges related to the increased battery centric business model, and organizational misalignment, along with six opportunities: develop service and maintenance-agreements, provide additional Add-on services, expand accessories offerings, develop over the air diagnostic capabilities, supply chain localization, pivot the subscription offering toward a premium offering

From the challenges and opportunities this thesis also presents an updated business model via an academically widely recognized business model framework, the Magic Triangle of Business Model Dimensions. The four dimensions of the Magic Triangle of Business Model Dimensions: Target customers, Value Proposition, Value Chain, and Revenue Model were all covered to together serve as an updated proposal of a business model for the aftermarket. The overall conclusion from the study is that the OEM's aftermarket division will experience change mainly related to lower revenue and profits. However, there are areas in which the value proposition could be pivoted, providing new and additional products and services using existing resources and capabilities, providing additional and new revenue streams for the aftermarket for OEMs. By tackling the most prominent challenges in the value chain, a more competitive cost structure could be realized to further mitigate the profit impact. Providing a more stable and diversified, albeit lower generating, revenue model.

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Keywords: Automotive industry, BEV, Aftermarket, Magic Triangle of Business Model Dimensions

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Jacob Gunnarsson & David Nyman, Gothenburg, June 2025

List of acronyms

Presented below is a list of used Acronyms that have been used in the research study, this is done to ensure that the reader has a clear understanding of all acronyms. The acronyms are listed in alphabetical order:

B2B	Business to Business
B2C	Business to Consumer
BEV	Battery Electric Vehicle
BMC	Business Model Canvas
CDC	Central Distribution Center
D2C	Direct to Consumer
ICE	Internal Combustion Engine
KPI	Key Performance Indicator
OEM	Original Equipment Manufacturer
OTA	Over the Air
P2P	Person to Person
PHEV	Plug-in Hybrid Electric Vehicle
PS&L	Parts Supply Chain & Logistics
Reman	Remanufacturing
RSA	Road-Side Assistance
TCO	Total Cost of Ownership
VOR	Vehicle Off-Road

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1. Introduction

The automotive industry is in the midst of change. The most obvious change is the transition the industry is facing with the move from internal combustion engines (ICEs) vehicles to battery electric vehicles (BEVs). In 2023, BEV sales worldwide grew 35% year-on-year to 18% of total sales (International Energy Agency, 2024). The growth over a five-year period is equally impressive, with 2023 annual sales volume being six times larger than five years earlier in 2018 (International Energy Agency, 2024). BloombergNEF (2023) forecasts the continuation of growth for passenger BEVs, projecting passenger BEV sales will reach 30 million in 2027 and grow to 73 million per year by the year 2040.

This trend of continual growth in BEVs can be assumed to continue with several underlying drivers. Among them is the drive for more sustainable transportation (Kumar & Alok, 2020). With countries pushing to achieve commonly signed climate goals, such as the Paris Agreement which 194 countries have signed, of having net zero CO2 emissions globally by the year 2050 (United Nations Framework Convention on Climate Change, n.d.). The EU has a similar climate goal for its member states, passed on as the European Union's European Climate Law, which strives to make the EU climate-neutral by the year 2050 (European Commission, 2021). With the transportation sector being among the largest contributors of greenhouse gases (GHG) emissions, contributing to a fifth of all world-wide emissions yearly according to Ritchie (2020). Legislators are supporting the transitions from ICEs to BEVs, as BEVs do not produce any tailpipe emissions according to the U.S. Department of Energy (2023).

The two largest economies in the world, USA and China, have separately supported initiatives to support this transition. As early as in 2015, the Chinese Prime Minister displayed China's strategic plan of modernizing the economy to produce more high-tech manufacturing products by the year 2025 in an initiative called Made in China (MIC) 2025 (Institute for Security & Development Policy, 2018). In this plan, 10 key areas and industries were presented in order to make this transition happen. One of these were “Green vehicles” and more specifically, BEVs. This has fueled the BEV development within China (Institute for Security & Development Policy, 2018). According to Yang (2023), China has become a world-leader in BEV manufacturing and the largest BEV market due to the Chinese government supporting it with several subsidies, tax breaks, and policy incentives both for the supply and demand side. Between the years 2009 and 2022, Yang (2023) describes how the government spent over $29 billion on BEV-initiative support, all in accordance with the MIC 2025 plan. The US government has supported its automotive industry as well, investing $7.5 billion through the Bipartisan Infrastructure Law to build a network of BEV charging stations, alongside this was an estimation that $85 billion was invested in manufacturing of BEVs and BEV-related products between 2021 to 2022 in the US (The White House, 2022).

Several countries and regions have announced a ban on the sale of new ICEs vehicles. This includes the EU, which has banned the sale of new ICE-vehicles from 2035 for its member states (European Parliament, 2022). Similar initiatives have been adopted in China (World Economic Forum, 2020) and the planning for 12 US States to ban new ICE vehicles sales by 2035 (Coltura, n.d.).

Manufacturers have also committed to the transitions. In 2021, all major automakers in the US announced the goal of by the year 2030, to have 50% of yearly automotive-sales be BEVs according to The White House (2022), which was said to be in line with the Paris agreement. Volvo Cars (2017) announced as early as 2017, that from 2019 and forward, all new cars will have an electric motor and that this marked the end of the combustion engine-powered car. Several other automotive manufacturers have made similar commitments to increase their BEV production, including the largest automotive manufacturers Volkswagen, GM and Ford (Volkswagen AG, n.d.), (General Motors, 2023), (Ford Motor Company, 2021).

The regulation against ICE vehicles and support for low emission drivetrain is continuing because of the world's drive towards meeting various climate goals, such as the Paris agreement. The likely outcome will be continued growth for BEVs in the foreseeable future**.** With the automotive industry transitioning towards BEVs, certain aspects of the business model need to change. One of these areas is the aftermarket.

The aftermarket is a vital economic part of the automotive business model, generally contributing to a minor part of sales but a significant part of profit for the manufacturers (Cohen, Agrawal, & Agrawal, 2006), (Elo & Katsardis, 2024). One example that was brought forward in Cohen et al. (2006), was that General Motors (GM) earned more net income from its revenue of $9 billion in after-sales services than from its $150 billion revenues for new cars sales in 2001. This is because after-sales services, such as selling spare parts, are a high-margin business (Cohen et al., 2006).

In addition to providing significant profit, Cohen et al. (2006) argues further that there are additional organizational wide benefits and strategic value in after-sales services. This includes reaping low-risk revenue over a long-term period, providing a meaningful way to differentiate against competitors, and the creation of an interaction point along the customer journey which enables deeper understanding of the customer. Specifically, to the automotive industry, after-sales services are a vital part for customer retention as there is a correlation between the quality of after-sales services and customer potential of repeat purchases (Cohen et al., 2006). A study from Ben Mahmoud-Jouini, Forero, and Midler (2008) describes how the aftermarket, specifically in the automotive industry, can even work as an experimental ground for testing new innovations. The case study described this from a perspective that suppliers of spare parts could learn and test products by going straight to the aftermarket, in a faster and lower-costing way than by incorporating it in the original products (Ben Mahmoud-Jouini et al., 2008). Another potentially valuable, yet overlooked, source of value for the Original Equipment Manufacturers (OEMs) in the aftermarket.

Elo and Katsardis (2024) describe how the automotive industry is among the largest and most important ones from a societal and political level, as the nature of the industry is such that it has clear effects on the economy, employment conditions, and the sustainability within any region it operates in. With the sheer size and economic contribution of the automotive aftermarket, if this area were classified as a separate industry, it would be one of the largest in the world (Elo & Katsardis, 2024). The aftermarket part of the automotive industry is also a very complex, intertwined, and multidisciplinary field incorporating many areas (purchasing, marketing, logistics etc.).

The purpose of this research study is to explore how the after-sales services will be affected with the transitions the automotive industry is going through, moving from previous ICE vehicles and PHEVs (Plug-In Hybrid Electric Vehicles) to BEVs, for the OEMs. By concretely describing and explaining the challenges affecting the OEMs, the key areas that are affected will be highlighted. Various proposed strategies, solutions, and implementations for the affected areas as well as a whole can therefore be derived. In addition, a pivot of the business model for the aftermarket area can be proposed, using a theoretical model of business model innovation. The theoretical model that will be used is the Magic Triangle of Business Model Dimensions (magic triangle) (Aarhus University, 2013).

Currently, the concrete effects of this transition have not been examined. By knowing the full implications this transition has for the OEMs, strategies for optimal positioning can be pivoted in order to derive optimal value from such a transition. Therefore, the main objective of this research study is to concretely describe key areas affected, both negatively and positively for the after-sales services given this transition from ICEs to BEVs. After identifying the key areas affected both positively and negatively, an analysis allows for strategies to be developed and proposed to better position for maximizing the positive impacts while proposing restructuring, repositioning, or changes to either transform the negative impacts into opportunities or mitigate the downside. These strategies, together with an improved business model for the aftermarket, which is better tailored for the challenges and opportunities, can be presented. The purpose of the study is to answer the following research questions:

1. What are the key opportunities and challenges for OEMs, with their transition from ICE vehicles to BEVs, in regards to after-sales services?
2. How can OEMs in the aftermarket innovate their business model in response to the effects from transitioning to BEVs?

In order to fulfill this purpose, this research has used a case study company. In this study a fictional name has been given to the case company. The case company will be referred to as [MobilityGo] throughout the research study for anonymity. MobilityGo is a European automotive manufacturer, and the company currently operates in most European countries.

Collaboration with MobilityGo was essential for this research study because MobilityGo itself is in the midst of such a transition. Having launched their first vehicle in 2020, which is a plug-in hybrid. The second vehicle, a BEV, was launched in October 2024. By going through the transition from ICEs to BEVs, MobilityGo's employees and key stakeholders have a first-hand perspective of the challenges that occur and have changed with the transition. Their input and information were valuable for the proposed research study, information that would otherwise be difficult to collect without the collaboration of an OEM. This research study was written in collaboration with the Parts Supply Chain and Logistics (PS&L) department at MobilityGo. The PS&L department is responsible for everything that has to do with spare parts, such as pricing, forecasting, demand planning, in-bound logistics, out-bound logistics, and outsourcing of key activities in the value chain. This department operates under the aftermarket division within the company.

This research study is right on time, mostly because such a proposed research study has yet to be made. In addition, the rapid growth of the BEV market, its underlying trends for continued growth, means the BEVs will likely continue gaining market share over ICEs vehicles for the foreseeable future. Furthermore, there is real life practical value that can be derived from this research study. Not only for the case study company, but also other automotive and transportation OEMs, other key stakeholders (such as workshops, suppliers etc.), and adjacent industries which are experiencing a similar transition to a new disruptive innovation which is affecting the after-sales services area.

This research study contributes academic knowledge to the field of the automotive aftermarket, by incorporating real-life practical examples via a case study of an OEM. In addition, strategies for repositioning, restructuring, and making overall changes to retrieve the maximum value from after-sales services, when there is a disruptive technology transitioning an industry are displayed. By applying an academic model of business model innovation, the Magic Triangle of Business Model Dimensions, on an existing problem. This study further contributes academic value to justify such theoretical models on a practical level, as well contributing insights and practical implementations for such models, further broadening the understanding and application.

The rest of this paper is structured as follows: Firstly, there is a theoretical background on the automotive aftermarket and on business model innovation, tailored to increase the readers' understanding of the topics. This is followed by the methodology of this paper, which describes in depth the method of data collection and analysis. The fourth chapter presents the findings, via outlining challenges and opportunities for OEMs and the case company. Chapter five presents a synthesization of the findings by applying an academic business model innovation framework, the Magic Triangle of Business Model Dimensions. Lastly, the paper concludes with final remarks in chapter six.

2. Theoretical background

In this chapter, previous research within the field of the automotive aftermarket and the OEMs' transition to BEVs will be brought forward. In addition, key theories of business model innovation will be presented, with a focus on the business model canvas, lean canvas, and the Magic Triangle of Business Model Dimensions (magic triangle).

2.1 Automotive aftermarket

Some previous research has been done on how the transition from ICE vehicles to BEVs can affect the after-sales services market. Dombrowski and Engel (2013) discuss that the increasing adoption of BEVs will affect the automotive after-sales industry in five ways primarily, three of which will have a direct negative financial impact for an OEM. According to Dombrowski and Engel (2013) these three are: 1. Decreasing share of mechanical and moving parts, where the authors estimated that the number of parts may fall by up to 90%, most of which are "wear parts" which need regular maintenance and replacement. 2. Fewer additional units, the new BEV technology will require new systems, but many more will become obsolete such as exhaust systems and oil pumps. All these systems, which will become obsolete, previously had the potential of failing and therefore generating spare parts. 3. Longer service intervals, with fewer moving parts and an electric engine which is not in need of frequent maintenance (compared to an ICE) means that regular service intervals would not be necessary. This means over the lifetime fewer visits to the workshop, where add-on services can be sold. In the last point, Dombrowski and Engel (2013) also emphasize the negative impact of losing the regular contact point with customers throughout the customer's journey. All these points lead to either fewer parts being sold which directly affects the demand for spare parts or the loss of potential cross-service selling opportunities. The lower demand may in turn negatively affect the profitability for an OEM.

Existing research has investigated the negative and positive impact the transition to BEVs from ICEs can have on OEMs and broad strategies for mitigation (Dombrowski & Engel, 2013). However, existing research is not done via a case study from the perspective of the OEMs. Therefore, the impact and strategies are broad, wide, and may not be contextually suitable for OEMs. These strategies are often lacking a detailed and concrete description for each impact and strategy, as well as the company-wide effects and practical implementations of a strategic shift. In addition, this research can, for a fast-changing industry, be considered old and outdated. Missing factors and recent changing aspects such as better technologies and shifting demographics, landscape, and customer preferences are not included. Therefore, there is a need to re-evaluate and research the BEV transition having the underlying trends in mind.

Other research has emphasized the general challenges within after-sales services, but has taken the perspective from a logistics or supply chain perspective, and has not factored in the strategic value of after-sales services and/or the specifics of the situation with transition to BEV (Cohen et al., 2006), (Kumar & Zahn, 2003), (Elo & Katsardis, 2024). Lastly, some research highlights challenges and skills development needed within engineering in order to bridge the gap with new emerging technologies such as electrical powertrains (Marsico, 2022).

The outdated research within the proposed research area, combined with previous research that either has insufficient focus on the key strategic impact for OEMs or not

enough focus on the after-sales business, justifies the need for this research study. Furthermore, the topic is highly relevant due to the importance of the automotive aftermarket and the impact BEVs are currently having on the aftermarket.

2.2 Business model innovation

With the changing nature of the automotive industry with the transition towards BEVs, the current business model for OEMs, especially for the aftermarket, will face several changes and a need to adapt along with the industry's change. In Gassmann, Frankenberger, and Csik (2013), the authors argue that excellent product and process innovations are not enough to survive in the long term for businesses, especially businesses in changing environments. Rather, to ensure long-term survival and success, a business's ability to adapt the business model to ever-changing environments is key. The authors even argue that the innovation of business models is even more important than product or service innovation (Gassmann et al., 2013).

Before the presentation of the most commonly used and widely recognized business model innovation models, there is a need to clarify what a business model and business model innovation are. This information is essential to understanding the content of this research study. A business model is described in Grant (2021) as the intended way a business creates value for its customers and profit for itself. This will serve as the foundation for the assumptions about what a business model accomplishes for a business in this study. Further described in Grant (2021) is the importance of the concept of a business model, which is not only that it defines and simplifies the logic of the business, but that the concept allows one to comprehend broader situations and a wider spectrum of opportunities. Ingram (n.d.) explains that the advantages of having a business model include providing a clear plan for the future, focusing on key value-creating components, and highlighting what makes the offer unique. It also helps to align and guide employees and decision-makers to pursue relevant opportunities and filter out irrelevant ones (Ingram, n.d.).

A business model innovation, on the other hand, is described in Northeastern University (2020) as the evolution of the business model, how a business reorganizes itself and adjusts the business model to deliver value for customers and profit for itself in a new way. This definition is of importance, as it will be the underlying theme of the research study is how the case company and OEMs could pivot their business model via a business model innovation.

2.2.1 Business model canvas

The business model canvas (BMC) is one of the most recognized academic models for business model innovation. The BMC consists of nine segments: Key Partners, Key Activities, Key Resources, Cost Structure, Value Proposition, Customer Relationships, Channels, Customer Segments, and Revenue Streams (Murray & Scuotto, 2015). With the nine segments, the BMC acts as a concept that describes how a business operates, via its content, structure, and transactions (Ekawati et al., 2024).

According to Murray and Scuotto (2015), the BMC drives a business to become focused on the customers, by placing the business itself in the ecosystem where it operates. It highlights the key activities, while simplifying an overview of the costs and revenues (Murray & Scuotto, 2015). It is a tool that can be used for both entrepreneurs, building and designing a business from scratch, and could also be used for existing large

enterprises, which need to pursue new growth opportunities and pivot the business model. The model allows for exploring new potential opportunities while capitalizing on existing structure. However, in this study, the BMC has not been chosen as it is very detailed and requires a very detailed-oriented description on several parts which are not fitting into the core scope of this research study.

2.2.2 Lean canvas

Canva (2025) describes how the lean canvas is an alternative model to the BMC, mainly targeted for entrepreneurs when validating and developing a startup business idea. The lean canvas has the same structure as the BMC, which is built on nine segments, but is more tailored to the problem-solution dilemma of a business idea, and is very popular in software development (Canva, 2025). In Miro (n.d.) it is described how the lean canvas model has replaced four segments in the BMC (Key Activities, Key Partners, Key Resources, and Customer Relationships) with (Solution, Problems, Key Metrics, and Unfair Advantage) respectively for the lean canvas. Further elaborated in Miro (n.d.) is how the two models serve different purposes and that the choice between the two models is dependent on several factors, such as business context and level of uncertainty in the business.

In Canvanizer (n.d.) it is outlined in which instances the BMC model compared to lean canvas is recommended to be used. The BMC is generally used for established businesses, which have a clear focus on strategic planning and operations, mainly because of the broad overview of current operations it gives. In contrast, the lean canvas is recommended to be used for startups, where the central idea is to identify customer problems, where the product or service could be easily validated and pivoted (Canvanizer, n.d.).

The lean canvas model has not been chosen for this study as it is mainly aimed for startup businesses and the validation of a business idea. The proposed research study aims to describe a pivoted business model for the existing aftermarket operations of an OEM. For the scope of the research study there are therefore frameworks which would be a better fit for this research.

2.2.3 Magic Triangle of Business Model Dimensions

Another commonly used academic model for the design and evolution of a business model is the Magic Triangle of Business Model Dimensions (magic triangle). This model serves as a good theoretical lens for this study as this model focuses on four dimensions: the Who, the What, the How and the Why, which are widely regarded as key components which make up a business model (Gassmann et al., 2013). The “who” is intended to clarify which customer group the business aims to serve. The “what”, clarifies what value the business delivers through its offerings. This dimension is sometimes termed as the customer value proposition and should describe how products and services together create value to the customer. The third dimension is the “how”, this dimension explains which activities, processes, and capabilities work together to bring forth the value proposition for the customers. This dimension is often referenced as the value chain. Lastly, the “why”, often called the revenue model, describes how the business model is built up by the three previous dimensions and generates revenue and profit for the business. This dimension should explain how revenue is generated, what mechanisms, channels, and drivers are involved, while also clearly outline the cost

structure of the business. All of the dimensions are grouped together because of their interconnectedness and can be displayed in a triangular shape (see Figure. 2.1)

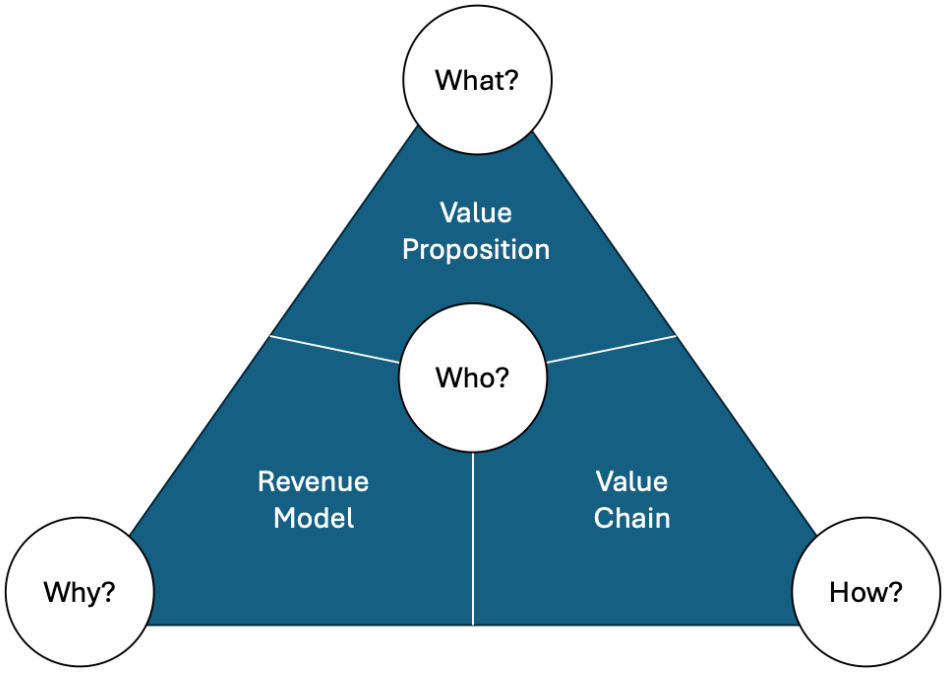


Figure 2.1: The Magic Triangle of Business Model Dimensions

In Aarhus University (2013) there is a description and clear outline of how the model can be used in a practical sense. For the "who", this dimension is segmenting the customers, identifying the target customers. This is in regard to both current and new customer segments. The "what" dimension describes the type of value via products and/or services created for each of the targeted customer segments, which is described in the first dimension. The third dimension, the "how", describes all activities and processes in the value chain, e.g., how the business creates the value that is delivered to customers. Lastly, the "why", describes how money revenue and profit is generated (Aarhus University, 2013).

The magic triangle serves as a good theoretical lens for this study as the key dimensions; the Who, the What, the How and the Why, are academically widely recognized as important driving forces for a business model (Gassmann et al., 2013). The magic triangle is further described in Aarhus University (2013) as a framework which is easy to use and apply for business, while still describing the interdependencies between the dimensions and how all dimensions need to be reinforcing for success. Previously described (see 1. Introduction) is the interdependencies of the automotive aftermarket, further reinforcing that this model would be a viable framework to apply for adapting the business model of the aftermarket division of an OEM with the transition from ICEs to BEVs. Other benefits highlighted with the magic triangle is that it provides a holistic picture of the business, incorporating both internal and external factors (Aarhus University, 2013).

Given that this research study aims to explore how a business model for an OEM's after-sales division can be pivoted, with the transition from ICEs to BEVs, the magic triangle has been chosen as the framework for this study. It will be through the magic

triangle framework a new pivoted business model will be presented. This as the framework is better aligned with the description of when the models presented in this chapter should be used. Along with the strengths of the model, it offers a good overview of the business, and the very interconnected parts of the rest of an OEM's businesses can be integrated. The magic triangle takes into account both internal and external factors, with a clear focus on the customers. The customer-centric aspect of the model is appealing as both the case company, MobilityGo, and several OEMs have a strategy that is centered around the customer. Lastly, the magic triangle model offers a much simpler framework which is of value since it offers simplicity to an often complicated process.

2.2.4 Previous research

Previous research within the area of business model innovations or redesign is limited, both for the automotive industry and its transition towards BEVs, and the aftermarket area of the automotive industry. Only a few previous research studies within the topic of this study. One study from Sholichah and Sutopo (2020) investigates and provides a practical application of battery swap services for battery electric vehicles (BEVs), using the business model canvas (BMC). Which concludes that in Indonesia, 9 key components of the BMC need to be implemented for a successful such business model. Which would then lead to a 16-month payback period for such a business endeavor. Another study from Sundin, Östlin, and Björkman (2021) uses the BMC to create a viable business model for remanufacturing of parts within the automotive industry.

The lack of previous research for business model innovation for the aftermarket segment of the automotive industry further reinforces the need for this study. In addition, the extensive use of the Business Model Canvas for business model innovation makes the study viable as it uses another model not as widely used (the Magic Triangle of Business Model Dimensions). By using a business model framework that is not widely used and for a segment not widely studied either, the automotive aftermarket. This study offers new theoretical and practical knowledge on using business model innovation on an unstudied market segment.

3. Research methodology

In order to answer the project's research questions, relevant data needs to be collected, analyzed, interpreted, and presented. The methods for this work will be presented and justified in this chapter. This research study has been conducted as a qualitative case study with data being collected through an interview study and analyzed through applying a theoretical framework.

3.1 Research approach

The research approach for this study included examining a single case company using a qualitative study. Qualitative research enables researchers to utilize non-numeric data in order to explore and present deep and comprehensive descriptions of subjects (Oranga, Matere, 2023). Qualitative research is especially efficient in gathering information about opinions and providing complex descriptions of how respondents experience certain phenomena. Moser & Korstjens (2017) describes qualitative research as a method of answering "why" and "how" rather than "how much" or "how many". The qualitative research approach suits this study as it enables deep exploration of experiences and opinions of the participants, elements hard to quantify but essential for answering the research questions examined.

A case study is a method used to understand a real-life company considering relevant conditions (Smith, 2018). Case studies are great means of research when research requires great depth of data and there is a unique or interesting story to be told. The main advantage of case studies is that it provides significantly more detailed information compared to other methods, such as surveys (Neale, et al., 2006). This being a single company case study, allows for deep understanding of the effects on the company from the transition from ICEs to BEVs.

3.2 Literature review

Conducting a literature review involves assessing and contrasting theories and arguments from various literature relevant to the scope of the research (Leite, Padilha & Cecatti, 2019). The purposes of a literature review are to identify what research has been conducted in a given field and what topics to further explore, to apply historical theoretical context upon the current research project, to characterize the links between theory and practice (Leite et al., 2019).

The literature used for review was mainly from web-based databases such as Google Scholar and Chalmers library, etc. Using web-based databases, keywords were applied to facilitate the sorting of articles and thereby making it easier to find suitable sources. Keywords that were used were e.g; "Automotive industry", "aftermarket", "spare parts", "OEM", "BEV". When these search terms are applied to web-based databases, it may result in a so-called "snowball effect", where one search leads to the identification of another important source, which in turn leads to another, and so on. The project team started initially with a limited number of keywords to construct a focused literature base within the project's area, which then were expanded through a snowball effect. Due to the vast amount of published material available online, the project team focused on identifying the most important publications, for example, those with the highest number of citations.

The literature review served the purpose of creating an initial understanding of the transition from ICEs to BEVs effect on the aftermarket for personal vehicles. This resulted in an initial understanding of the field, needed to create the questions and guide used in the interview study. Furthermore, the review examined strategies to optimize the transition from ICEs to BEVs in the perspective of an OEM. Frameworks presented in other case studies or related literature were also of interest in order to further analyze data from interviews.

3.3 Data Collection

Data for this case study was collected via interviews with employees from the case company. Interviews are a means of collecting data and gaining insights into respondents' perspectives and expertise within a chosen field, as stated by Bell, Bryman & Harley (2019). The interviews were conducted both in person and online, the interviews were recorded and transcribed in order to be used as the basis for analysis and results, with exceptions for one interviewee that requested not to be recorded (See Table 3.1 below for data collection method).

Interviews were conducted with the semi-structured interview approach. Bell et al. (2019) describe different types of interview studies, including the semi-structured interview. This type of interview study was preceded by the creation of an interview guide containing a set of predetermined open-ended questions, see Appendix for interview guide. These questions did not have a specific order in which they must be asked. The open nature of the questions allowed for follow-up questions, fostering dialogue and enabling interviews to start from the same point but then take different directions depending on the interviewee's knowledge and interests. This openness in dialogue is the greatest advantage of the semi-structured interview, as it provides the opportunity to capture as much expertise as possible from each respondent (Bell et al., 2019). The semi-structured interview is a great fit for this case-study as the goal is to explore and expand upon existing theory, hence reaping the benefits of this type of interview.

Using the semi-structured interview approach, this study focuses on examining the effects of the transition from ICEs to BEVs on the aftermarket for OEMs and how to construct a business model to adapt to these effects. The interview study also focuses on examining and discussing different strategies related to the effects of the transition.

The format of the interviews were one-hour interviews either in person or remote, depending on the geographical location of the interviewee. Interviewees of the study were those employed by MobilityGo. People of interest were those related to; logistics of spare parts, spare parts offer, aftermarket services offering, engineering, dealerships etc. Interviews were conducted on an ongoing basis and the interview guide was shaped by the results and insights gained as the interview-study progressed. The format of the interviews included asking pre-determined questions from the interview guide as a base and then letting the conversation take the interview to new areas depending on the expertise of the interviewee. The last interview was conducted as a means of validating the findings with the Head of Parts Supply and Logistics. The findings were presented and then discussed with the interviewee and resulting in validation and adding nuance to the findings presented in this thesis.

Data collection carries a risk of misinformation and biased information due to various underlying interests. Therefore, this report carefully examined the collected

information, both from the interview study and the literature review, using triangulation. Triangulation involves gathering the data through multiple methods. The literature was evaluated based on Denscombe's (2014) four criteria for data collection from scientific articles. These four criteria are validity, meaning, representativeness, and credibility.

This being a case-study, there is of great importance to handle sensitive data with integrity, both in terms of the data collected through interviews, but also additional descriptive quantitative data shared with the project team. Firstly, informed consent was obtained from all interviewees of the interview study. This process involved providing clear information about the study's purpose, procedures, potential risks, and the voluntary nature of participation, ensuring that interviewees were fully aware of their rights and the scope of the research (Mohd & Arifin, 2018). Secondly, to uphold confidentiality and anonymity, measures were implemented to protect interviewees identities and sensitive information in accordance with requirements from MobilityGo.

Table 3.1
List of interviewees

Interviewee	Position	Date	Length	In person/ Online	Data collection method
Interviewee 1	Head of Parts Supply Chain and Logistics	2025-02-07	60 min	Online	Recorded + Transcribed
Interviewee 2	Logistics Engineer	2025-02-11	45 min	In person	Notes (per request of interviewee)
Interviewee 3	Supply Chain Coordinator	2025-02-11	45 min	In person	Recorded + Transcribed
Interviewee 4	Supply Chain Coordinator	2025-02-11	45 min	In person	Recorded + Transcribed
Interviewee 5	R&D Project Manager	2025-02-18	60 min	Online	Recorded + Transcribed
Interviewee 6	Supply Chain Manager	2025-03-07	60 min	Online	Recorded + Transcribed
Interviewee 7	Spare Part Engineer	2025-03-07	60 min	Online	Recorded + Transcribed
Interviewee 8	Head of Method and Diagnostics Development	2025-03-07	60 min	Online	Recorded + Transcribed
Interviewee 9	Head of Aftermarket	2025-03-12	60 min	In person	Recorded + Transcribed
Interviewee 10	Network Development Manager (France, Belgium, Netherlands)	2025-03-27	45 min	Online	Recorded + Transcribed
Interviewee 11	Network Manager	2025-03-27	60 min	In person	Recorded + Transcribed
Interviewee 12	Head of Aftersales Commercial Operations	2025-03-31	45 min	In person	Recorded + Transcribed
Interviewee 13	Lead for Add-ons, Accessories, and Aftermarket	2025-04-01	45 min	Online	Recorded + Transcribed
Interviewee 14	Head of Financial Services and Offer	2025-04-04	60 min	In person	Recorded + Transcribed
Interviewee 15	Head of Parts Supply Chain and Logistics	2025-05-07	60	Online	Recorded + Transcribed

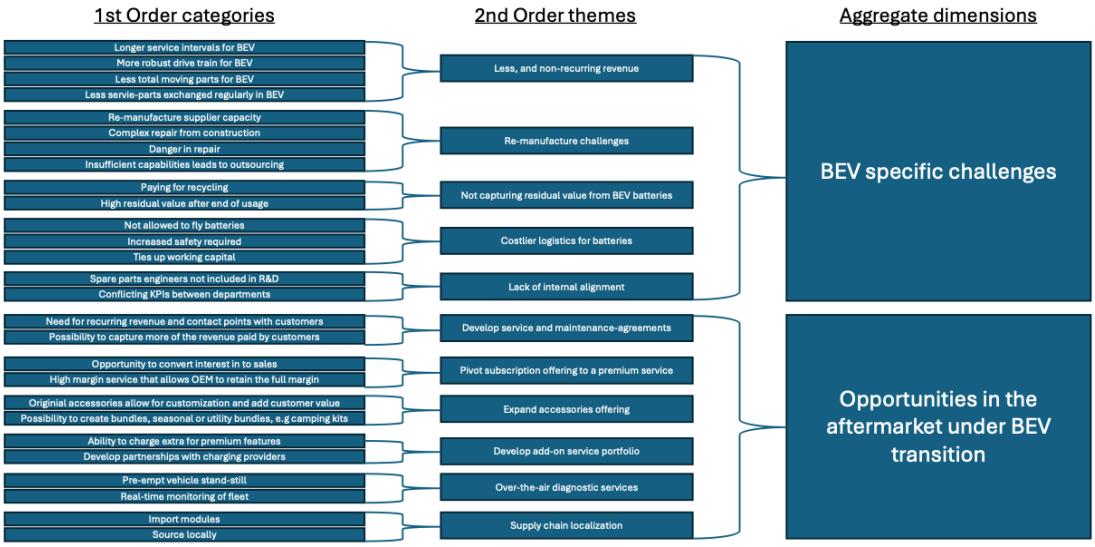
3.4 Data analysis

The data analysis of this research study has been conducted as a thematic analysis incorporating theories and frameworks supported by literature. Bell et al. (2019), states that analysis of qualitative data should focus on finding and relating repeating themes, similarities and differences, to theoretically related material.

The data gathered through the case study has been analyzed with a Gioia framework in order to add rigor and validity to the findings. The Gioia methodology is a qualitative methodology aimed to develop data analysis fulfilling the standards of trustworthy research in the regards of rigor (Gioia & Magnani, 2022). The Gioia methodology utilizes inductive reasoning whereas the data is used as a starting point and from there patterns and themes emerge, eventually creating categories. This is conducted through an iterative process where data collection and analysis happen simultaneously in cycles, and new data is continually compared with existing findings in order to refine

categories. Data is collected until theoretical saturation is achieved, meaning that no new insights are emerging.

Implementation of the Gioia method as a tool of data analysis in this study included three main steps as supported by Gioia & Magnani (2022). First, coding data and creating categories, assembled in a data-structure containing 1st and 2nd order themes and aggregate dimensions. The 1st order themes are statements and quotes gathered directly from informants as data points. The data points are interpreted by the researchers and grouped into broader and more abstract categories and patterns, resulting in the 2nd order themes. Finally, the 2nd order themes are grouped into aggregate dimensions, these are at the highest level of abstraction. This data structure is configured into tree structure, serving the purpose to aid readers in understanding the process from raw data to terms and theme in conducting the analysis, ultimately demonstrating rigor in the qualitative research (Gioia, Corley & Hamilton, 2012).



3.5 Case company description

MobilityGo is a start-up brand which launched its first vehicle in 2021. This vehicle still exists on the market and got a facelift in 2024. This vehicle is a plug-in hybrid electrical vehicle (PHEV), (referred to as X this report for anonymity). In 2024, MobilityGo launched their first BEV (Y), and in 2025 launched a second PHEV (Z).

MobilityGo started selling their cars via dealerships in 2024, whereas previously the approach was to circumvent dealerships by selling their cars direct-to-consumers (D2C). This represented a big shift in the business model as dealerships are a primary source of selling after-sales services to customers. Including everything from accessories, maintenance and service agreements to repair jobs. Now the case company has three options for customers who would like a vehicle; buying the car at a dealership, buying it online, or sign up for the subscription programme.

The subscription model is a unique feature with the case company. The subscription model offers customers a fixed monthly price where everything is included such as taxes, insurance, service & maintenance, road-side assistance, winter wheel storage and assembling. The monthly subscription does not have any obligations, there is only a month's notice period. Included in the subscription model is the car-sharing software. Subscription owners via the car-sharing app can share the vehicles with whoever they want such as with family, friends, neighbors, or the community at large for a reimbursement totally decided by the subscription owner. That reimbursement is then subtracted from the monthly fee paid to the case company. With the person-to-person (P2P) car-sharing, all insurance is handled by MobilityGo.

Another unique selling point for MobilityGo is that all vehicles are equipped with a very high base or core of offerings specs and equipment such as 360-camera, steering wheel heating etc. Significantly different from other manufacturers who usually sell a car with limited specs and customers can add on whatever equipment they want. For MobilityGo customers only choose between colors and can choose some more specific equipment such as a tow bar and a roof rack. Part of the reason for selling fully equipped vehicles is because when new customers are trying car-sharing, it then serves as a great marketing for the vehicle and as a test-drive. Additional accessories, such as tow bar and roof-racks, are purchased separately by the customer at a workshop and installed there as well. In the current business model, the case company does not have a large catalog of other accessories, which does not need installment, such as carpets and dog cages. This is because the previous focus of the business model of supplying fully equipped vehicles to the subscription fleet with a great offering.

All vehicles that are sold by MobilityGo are manufactured and produced in China, then shipped to Europe. In port, all vehicles are equipped with market specific aftermarket items. As all markets have a bit different legislation and regulation of what is needed in the vehicle. For example, in Belgium, all vehicles need to have a fire extinguisher and warning triangle, whereas some markets might not require that. All this specific equipment is also handled by the aftermarket division, and is called pre-delivery inspection. This equipment is a bit different from the rest of the spare parts as they are sourced locally.

As noted in 1.2, the aftermarket business model is an essential element of any automotive manufacturer, this includes the case company. Despite the importance of the aftermarket, there is no representative from the aftermarket division in the executive management team.

MobilityGo’s vehicles have a warranty program in which all new vehicles have a four year warranty program and two year road-side assistance (RSA) program. The warranty program covers manufactured faults and unexpected parts failure. These programs are essential to guarantee the quality of the vehicle for the customer and help sell the vehicle in the first place.

The demand for spare parts is such that typically in the first three to four years, the demand steadily grows, as cars have more wear and tear, and accidents. Customers in the first couple of years are also more likely to go to a partner workshop in this period. After the three to four years, when the car has typically changed ownership from the first owner and the warranty period is out, the demand drops. This as a more price

conscious consumer owns the vehicle and the grey market suppliers have entered the market, making it possible for consumers to go independent garage.

MobilityGo has roughly 300 partner workshops throughout Europe. All these workshop partners are established dealerships for another automotive manufacturer, primarily aimed at fixing these vehicles, but have expanded their scope to cover MobilityGo's vehicles as well. The case company has a close collaboration in the spare part business model with another automotive manufacturer, where MobilityGo has chosen to outsource distribution and warehousing. This means that, for the aftermarket activities, MobilityGo is responsible for forecasting, inbound logistics (getting all parts to the central distribution center (CDC)) and pricing of the spare parts. From there the partnership automotive manufacturer handles the storing and shipping of all purchase orders to the workshops when parts are ordered. This goes for return and claims as well, that are all being handled by the partnership OEM's distribution network. As for the inbound logistics, all spare parts are being bought from the mother company, based in China.

Supplying spare parts for subscription cars and purchased vehicles also varies. As with the subscription fleet, where service is included in the monthly fee, MobilityGo gets billed for the manual labour and the spare parts occur as a cost, rather than revenue which is for the purchased vehicles.

4. Findings

The findings presented in this chapter are derived from the data structure presented in the methodology chapter (See Figure 3.3). The chapter follows the structure of the two aggregate dimensions presented in the data structure. Within each of the aggregate dimensions, the second order themes that constitute the dimensions will be further presented.

The first aggregate dimension is focused upon Battery Electric Vehicle specific challenges, including second order themes regarding changes in the business model and challenges. The second aggregate dimension is focused on opportunities in the aftermarket following the BEV transition.

4.1 Battery Electric Vehicle specific challenges

From the first aggregate dimension of the data analysis, five specific challenges related to the transition OEMs and the case company are experiencing in the aftermarket with the move towards BEVs could be highlighted. Each finding from the respective challenges will be presented below.

4.1.1 Adaptation and change in existing aftermarket business model

The underlying and most recurring challenge from the data analysis for the transition towards BEVs was that the current and established business model of providing aftermarket products and services is changing. It was noted by several interviewees that the drive-train for BEVs are technically more robust than ICEs, and therefore have a longer time period between required maintenance sessions and check-ups. For the case company, their PHEV has scheduled maintenance every second year or 30 000 km whereas the BEV has scheduled maintenance every second year or 40 000 km. There are also fewer components (service-parts) that are changed for the scheduled service for the BEV, where only the cabin air filter and brake-fluid needs to be replaced compared to the PHEV, which changes four parts: oil filter, engine air filter, oil gasket and cabin air filter. In addition, the PHEV also needs to replace the engine oil. For OEMs and workshops these service-parts are a recurring, stable, and predictable source of revenue and profit that will be significantly lower with the transition.

I8 - "The (BEV), has scheduled maintenance every two calendar years or 40 000 km, we have extended that distance since we don't need to bring them in as often. In comparison, the service interval for PHEV is 30 000 km or two years, whereas for electric cars, it is 40 000 km or two years. The components that are replaced and the costs for service are significantly lower [for the consumer]."

Interviewees also highlighted that the longer service intervals provide a challenge for OEMs and the workshops, as the time a vehicle is in a workshop decreases. This means that the opportunities to sell spare parts and additional products and services will be fewer, affecting the ability for the workshops and in turn OEMs to generate revenues. The longer service intervals affect the customer relationship from the OEMs perspective, as every time a customer comes into a partnership workshop, it provides an opportunity to gather data, feedback, and interact with the customer. With fewer interactions, it will be harder to maintain the customer relationship. It was also

highlighted in the data analysis that another challenge with less periodic maintenance and check-ups is that it lowers the probability of finding hidden faults that may have cars fully break down. Having cars breaking down by the side of the road is bad marketing according to I9, as the sense or perception of quality will be lower if a customer has his car breaking down.

I9 - "... with longer periods between maintenance [for the BEV], the time a car is spent in a workshop minimizes. Each time a car comes to a workshop is a selling opportunity for the workshops. And periodic maintenance is a way to maintain the customer relationship".

I9 - " I [MobilityGo] want to make sure you get quality in your car. I want you to avoid breakdowns. In other words, you shouldn't be stuck at the side of the road with your car. That's what you're doing with regular maintenance check-ups"

It was noted by the data analysis from several interviewees that some parts in a BEV will either increase in consumption or are totally new. In addition, some of the current parts will go extinct. In general it is described by I8 that the biggest shift in spare parts between a PHEV and BEV is that BEVs have a much more robust drive-train, and are easier to repair than PHEV. A PHEV has its most complaints and problems with the drive-train. Where most such parts will be replaced due to the battery powered engine of a BEV, such as parts related to the exhaust systems, fuel system, and transmission-related components. It was noted for interviewees that BEVs however are much heavier due to the batteries, which increases pressure and therefore wear and tear on the chassis components, suspension and tires. Brakes, for BEVs, will also have more frequent changes as BEVs use regenerative braking because such braking increases the range for the car. This has consequences as the brakes will be used less and start to rust, get stuck and therefore need to be exchanged. There will therefore be an increased use of spare parts for these parts or systems (most likely chassi components, suspensions, tires, and brake related products) compared to for PHEVs and ICEs. However, several interviewees describe that the increase in such parts and systems for the BEV can not make up for the loss of revenue and profit stemming from the sale of the service-parts for a PHEV. This particular challenge is not limited to the case company, but all OEMs transitioning to BEVs from a drivetrain of the combustion-engine type. It was brought forwards from the data analysis and interviewees that this is because of the high margins on such service-parts products. One significant challenge for the OEMs is therefore, how to recoup revenue and profits lost and if there are ways to continue keeping customers coming into the workshops as frequently.

4.1.2 New challenges and strategy related to the remanufacturing of battery

With the increased BEVs sales, the need for battery remanufacturing (reman), servicing and repairing of broken batteries, has increased significantly. This has increased the demand for reman, putting pressure on either developing internal capabilities or ensuring capacity at an outsourced supplier. Interviewees described how the case company has chosen to outsource reman to a third party provider. This is because the volume is not deemed big enough to justify establishing the new, highly technical capabilities, with increased safety measures, and speciality tools and facilities required to perform reman. Choosing to develop capabilities internally has benefits which were gathered from the data analysis, such as increased visibility in the supply chain, easier

to control fluctuations in demand (scale up production or handle lower demand than expected for periods), and lesser manual coordination and logistics handling which can increase the speed by which reman can be done. If the need for reman increases significantly, potential cost savings could also be realized in the future by developing internal capabilities according to interviewees. Currently, as demand has increased for MobilityGo and with other manufacturers, a challenge is getting sufficient capacity at the suppliers. Determining whether to outsource or develop reman capabilities internally is also a challenge and a decision that should be made based on future determined volumes and need for reman. Multiple interviewees described how great reman capabilities will most likely be very important in the future for OEMs that will move towards BEVs, for the aftermarket. Both from a sustainability perspective, as customers are becoming more aware and requiring more sustainability, and just how essential battery reman will be in the business model to recoup the value of a battery, or replace all partly broken batteries.

I1 - "...I don't think anybody that needs their car repaired is going to say "I'm only going to buy this part because it's sustainable". Do I think in the future there might be some changes? Actually I do because there is a lot of reman that you could do or recycle. I mean brands will start playing that card."

I9, when asked whether developing such reman capabilities internally will be essential "When we have the volumes, yes… But right now, we don't have any volume."

Another challenge that was brought forward from our data analysis for most OEMs, including the case company, is that many workshops do not have the capabilities to perform reman. This is putting significant pressures on OEMs to either develop reman capabilities in many locations though-out the regions present in or to handle the logistics of sending batteries for reman to and from one location. MobilityGo's reman supplier has one location for their reman-site, meaning that administrative work, such as handling the logistics of transporting the batteries and applying for certificates for cross-border transportation has to be done. Additionally, as batteries require specialty transportation due to safety regulations, this adds additional costs and complexity to the supply chain.

I1 - "Right now we have a quite centralised battery repair strategy or one could be saying that we actually have a lot of waste in that flow today saying we take the battery from the workshop, we send it to a central location where they repair it."

For reman of batteries, the first challenge is to choose whether to outsource this rather essential part of the value chain for aftermarket for BEVs or to develop it internally. Each choice brings significant challenges, such as investments in facilities and tools, developing technical and engineering skills, and integration of reman into the supply chain. All challenging in itself to achieve. If chosen to outsource, such as for the case company, the challenges are related to establishing a more efficient and integrated (with the supplier) supply chain to minimize waste and administrative work. While also ensuring that there is enough capacity and that the reman is of high quality work at the supplier.

4.1.3 Capturing residual value for end-of-life batteries

Another new challenge for OEMs will be what to do with batteries which still have capacity left in them, but are deemed insufficient for continued service in a vehicle. The data analysis revealed that the case company, MobilityGo, are currently scrapping batteries that cannot be remanufactured directly. These scrapped batteries are being handled by a third party, despite potentially having capacity and value left in them. Establishing a strategy of how to capture as much of the value left is a challenge going forward. Interviewees described that such strategies could potentially be recycling, finding alternative use of old batteries, or increasing the capacity via reman. The data analysis revealed that increasing the capacity of a battery which has been significantly used and lost capacity is challenging and expensive, often requiring the replacement of the battery to increase capacity.

I8 - "The problem is that batteries are made up of many individual cells, and all these cells need to be balanced. So, while it's possible to replace one module with cells for another, this alone doesn't significantly increase the battery's overall capacity. Essentially, to make a real difference, all cell modules would need to be replaced at the same time, which would basically mean having an entirely new battery."

The data analysis displayed how the smaller batteries for the PHEV at MobilityGo do not have a deposit system, where customers get money back for the return of a battery. This is something that is established for the new BEVs at MobilityGo, as a way of recouping the batteries. However, MobilityGo does not have any recycling capabilities or any strategies for what to do with returned batteries. The deposit-system is such that the value of the battery alone represents a majority of the value of new BEVs at MobilityGo. I9 described how a new battery for the BEV costs roughly 50% of the purchase price of a new vehicle, the battery is very expensive in proportion to the vehicle. Determining, at which point to replace a battery, due to lost capacity is also a challenge. Since in some instances, as of now, the value of the new replaced battery might be higher than the vehicle itself. With some OEMs, such as MobilityGo, not having a clear use of batteries with impaired capacity, the proposal of replacing such an impaired battery might not be economical. Thus, providing a challenge as to how to handle the inquiries and a strategy of capturing residual value for batteries and setting up a strategy of what to do with recouped batteries, and establishing capabilities to implement such a strategy.

4.1.4 Logistics challenges related to the increased battery centric business model

With the increase in BEV sales, the logistics side for the aftermarket will lean towards being more battery centric as the drive-train for BEVs is very battery centric. Meaning that more transportations of batteries will occur than for PHEVs. From multiple interviewees it was noted that transporting batteries with the increased safety regulations, means that transportation will become more expensive, both for the transportation but also with increased administrative needs, such as applying for certifications. Interviewees described that with the majority of battery manufacturing occurring in China, the European market is facing increased needs for certifications for transporting. These certifications are costly to apply for and require a significant

amount of time to comply with. With the already long transportation time from China, the lead time is also longer for batteries than other spare parts.

I3 - "The lead time is quite long, and also its production time is also long. I mean [batteries are ordered in] the China market, so the whole cycle is much more than four months, I would say at least six or seven months. And also here, the transportation cost is much higher than the ordering common parts, as they [the batteries] have to provide [have] many kinds of certificates on those kind of things, and also special packaging"

I6 - "Compared with the normal shipment, probably the transportation fee will be 50% higher than the normal shipment [by doing it for batteries instead]. However, the transportation fee, it's just a small portion of the dangerous goods transportation cost, because before the transportation we need to prepare a lot of certifications"

From multiple interviewees it was noted that batteries are deemed generally unfeasible in regards to the possibility of transporting via air, this due to the heavy weight and increased safety regulations. As the possibility of faster transportation, via air, is becoming more expensive and unfeasible. It puts pressure into more planning and increasing a safety sock, which incur costs.

I1 - "You can fly modules to batteries, but not batteries itself. Unless you really find the right documentation and money for it."

The increased complexity of transporting batteries which is a dangerous good, is challenging and requires significantly more administrative work. Such as applying for the right certifications in time, ensuring that they are followed, and staying on top of changing legislation.

I1 - "I mean, there's a lot of legislation that you need to follow on how to transport these and package these things", and "... [there is increased] complexity is a dangerous good.", " battery transportation has been rapidly growing and the legislations are rapidly changing"

Another challenge that I1 touched upon was that storing the new lithium batteries is challenging as batteries in storage need to be charged before being transported out. Which adds a dimension of complexity and coordination. In addition to the increased charging needs, warehouse-storing of batteries requires following new safety regulations. Safety regulations in regards to environmental concerns, with disposal and environmentally dangerous waste. There is also fire safety, as lithium batteries are notoriously difficult to put out and dangerous giving out exceptional heat, smoke when on fire. There are also occupational safety and health concerns due to the high voltage in batteries, warehouse workers need to be properly trained in how to handle the dangerous goods. It was revealed that OEMs need to ensure that these regulations are being followed, even if warehousing and storage is outsourced. Lastly, interviewees noted that problems are also arising in the form of coordination, as there are no unified standards for safety regulations cross-border between countries. These are all administrative and coordination challenges that arise from storing batteries.

I1 - "Even Though the European Union has as one guideline, each country has their own additions to the guideline on how you store batteries, how much you can store..."

Just as in 4.1.2, for the case company, there are capacity issues, meaning difficulties getting enough storage needs, as storing of batteries is a rare capability, mainly due to the safety regulations and legislations. This is because of the shortage of warehousing capacity for battery storage, and the slow nature of becoming a certified warehouse for batteries due to the safety legislation. Combined with the rapid growth in BEVs and in lithium batteries, has increased the demand for storage and made getting sufficient capacity in the industry hard.

I1 - "The capacity [of storage] is going to be an issue because I mean the whole. Warehousing firms haven't been able to ramp up to the level where you basically will be able to store that if now a lot of batteries will come. And I mean the question is will they be able to catch up."

Together, the data analysis shows that increased complexity, coordination, and administration of storing batteries combined with all safety legislations that needs to be followed, increases the cost of storage for OEMs as batteries are becoming a larger part of storing with the transition to BEVs. The shortage of warehousing capabilities, either getting capabilities for internal development of warehousing or outsourced, creates a supply and demand imbalance, meaning that warehousing is becoming more expensive. All of which are increasing the cost of storing spare parts for OEMs.

I1 - "When it comes to storage as well, you need to charge those batteries once in a while, which of course adds an additional complexity and cost to it as well."

Batteries are also expensive in purchase price, much more expensive than the PHEVs parts that are disappearing with the transition to BEV, as noted by several interviewees. In addition, because of the long lead time for batteries (described earlier), how critical the part is (e.g, if a customer needs to replace a battery and there are none, there is a high risk of that customer not being able to drive the vehicle, called Vehicle Off Road (VOR)), and as I4 described that accurate forecasting of demand is challenging because demand is rapidly growing and since BEVs are relatively new there is not as much data that can be used. This is even more true for the older a vehicle gets, where very limited data exists. Thus, OEMs will need to keep a large inventory of batteries. The larger required inventory and how expensive these batteries are will tie up more net working capital and cash for OEMs in just storage and inventory of spare parts, and potentially increasing the costs of spare parts in general.

4.1.5 Organizational misalignment, functional separation, and lack of a coherent strategic plan for the aftermarket business model

With new challenges arising from the transition, OEMs need to adapt and change the business model to face several challenges. This requires significant internal coordination and alignment. An overarching challenge, which is internally related for the case company, is how lack of internal alignment and functional separation slows down decision making and collaboration. From the data analysis one could see that there were conflicting interests between departments at the case company, MobilityGo, and of what role the traditional spare parts model will have in the future and within the

company. MobilityGo, has essentially two sets of customers: regular purchased vehicles and a large subscription fleet, where customers pay a monthly fee, where everything is included such as spare parts and maintenance. For the regular purchased vehicles, every spare part sold contributes additional revenue. For the subscription fleet, all spare parts for this fleet are from a company-wide perspective considered an expense. Finding the balance in pricing is therefore a big challenge, as the price essentially needs to accomplish two things at the same time; be low for the subscription fleet and high when sold to regular vehicles. Bringing an internal challenge of how to price the spare parts optimally.

I1 - "For parts, in regards to sales, you could say subscription is my biggest customer from a company perspective as a whole. Of course subscription costs are a cost to the company."... "Of course, the revenue for the company as a whole comes from the cash customers, the traditional customers [for spare parts]."

The data analysis revealed that pricing of the spare part has in the past, when the majority of vehicles were within the subscription fleet, not been a priority to the company. With the shifting focus on purchased vehicles, there is increased focus on pricing. Setting up efficient processes for pricing will be a challenge for the case company. Today, pricing could be more efficient if systems supported by arranging articles per group and from there determine a weighted discounted system for each specific product-category and market according to I11. Another challenge for pricing is to factor in the cost of a spare part when pricing. Which in some cases can be relevant as transportation costs can variety greatly, especially for batteries (see 4.1.4).

I11 - "You always start from the top, I always look at what the price is that a customer is willing to pay at most. You never look at the cost [when pricing a spare part]."

Another finding from the data analysis is that the case company, MobilityGo, and most likely other OEMs as well suffers from conflicting interests between departments. An example is that the spare part engineering department is responsible for determining which parts should be considered a spare part. Their departmental goal was described by interviewees as to make the service as cheap and fast as possible for consumers. This is done by breaking down larger parts into smaller components because it is generally cheaper for consumers to use the smaller components. For example, replacing screws inside the door is cheaper than replacing the whole door. However, this break-down needs to be balanced as smaller parts generally require more manual-labour work at the workshop which incur costs for the consumer. From a company standpoint, having too many parts which are not bought frequently is not ideal either as it adds costs in the form of warehousing and increases capital tied up in inventory. Finding the optimal balance is the job of the spare parts engineers, with the overarching goal of lowering the costs of servicing a vehicle for customers. This is in stark contrast to the commercial side, which from the data analysis showed how these departments want to maximize the revenue. This is done by selling as many spare parts as possible, and as often as possible to the customer at the highest possible price. These objectives are not reinforcing, but rather two seemingly conflicting priorities and KPIs. The challenge from a company standpoint is to work together, cross-functional and departmentally, to find the optimal balance between these two perspectives; minimize time at the

workshop and TCO for the customer, but ensure that there is sufficient time for workshops to sell additional products.

I9 - "[Method and Diagnostics Development] is always chasing efficiency, making things as easy as possible to change in the shortest time possible at the workshop. Ideally, they want us to just take two minutes to drive past the workshop. Not me [head of Aftermarket]! That brings us back to the issue; I want you to hit the brakes. Look at this! It's not good. I want people to find more faults. And, I also want our partners to have the time to work and make money from this. If they don't make money with us, we have a contradiction"

Building on the same challenge of internal alignment, it was revealed from the data analysis that the production and designing of vehicles suffers from two departments trying to accomplish two conflicting ideas at MobilityGo. These two departments are the spare part department and manufacturing. Manufacturing generally wants to set up production to be as cheap as possible to minimize the production cost of the vehicle, whereas on the other side, spare parts engineers want to produce a vehicle that is easy to serve (as it becomes cheaper). These two objectives of serviceability and cheaper production designing tend not to go hand in hand as noted by the data analysis which revealed that building something that is easy to service usually comes at the cost of not making it as optimized for production. Furthermore, the data analysis showed from interviewees that the spare part engineering department has limited influence in the early stages of the designing phase of new vehicles, where if given more influence could make the serviceability of the vehicle easier and cheaper. Finding the balance between these two objectives, between departments with conflicting goals, is another challenge for the case company.

I8 - "There are different design philosophies, and you can either build something that is designed for manufacturing, which means it is highly optimized for fast production. Or you can build something that is designed for service, which may increase manufacturing costs."

I7 - "Think if we could be involved in the design phase as early as possible. Of course we can contribute our experience and knowledge and I would say if we are going to do that, our purpose is of course to make the car to be serviced as easy as possible."

Other challenges that are based upon internal alignment is that there are opposite views between departments on key issues for BEVs. One such difference that was revealed from the data analysis was different views on how to capture residual value in batteries. The head of Method and Diagnostics Development (I8) believes that since it is difficult and expensive to increase capacity in batteries, it often requires exchange of the whole battery (see 4.1.3). Thus, I8 believes that vehicles will not change their battery, rather use of a BEV with decreased battery capacity will be used for shorter distances and the vehicle will have a lower value or purchase-price, which should be mirrored by the lack of capacity. On the other side, the head of Spare Supply Chain and Logistics (I1), also responsible for pricing and reman, thinks that batteries will be replaced once capacity is not sufficient or deemed enough for customers. By then still carrying maybe 50-70% of max capacity. These two opposite views is challenging for the organization as I8 beliefs does not require MobilityGo to develop any capabilities for the after-life of such batteries (more than reman of broken batteries and recycling) whereas I1, believes

focusing on the after-life of the battery is essential and finding alternative use for it when the capacity is beyond acceptable for a car.

I8 - "My assumption is that we probably won't go in that direction [replacing batteries with low capacity], and if you look at electric cars that have been around for a long time, I'm not aware of anyone who has done that. Instead, batteries have essentially only been replaced when there is something wrong with them."

I1 - "Definitely one of the things to be looked at because I mean in the vehicle, the grid situation, you could always wonder. I mean there is always a value in the car because the car is actually a perfect battery for your home as well"

Another difference of opinion revealed from the data analysis is who this transition to BEVs is going to influence the most. Some interviewees were convinced that it will be much worse for workshops, whereas others believe that OEMs will suffer more. This is another key issue or area in which differences of perception are influencing how a problem should be solved. Network managers believe that the biggest problem will be for partner workshops, which will in turn influence the revenue and profit generation of the OEM. The solution then is to help the workshops in order to help oneself. The problem is so big that it might influence the organization as whole by having dealership consolidation, which is not good for OEMs. Other interviewees believe that the biggest impact will be on the OEMs, as workshops can easily pivot to supplying other things, like washing or paint jobs of the vehicle.

*I10, when asked whether OEMs or workshops are going to have the biggest problem with the BEV transition: "Workshop on our side. We [*MobilityGo*] make money on selling parts and on selling cars."*

The last point in regards to the differences of opinions between departments that is stemming from the data analysis is on what role and strategic importance the spare part will have in the future. I14, which is part of the product and strategy team (not under the aftermarket division) truly believes that the spare parts model will be very much affected but that there are other ways to recoup profit and revenue shortfall stemming from the BEV transition. I14 further believes that the spare parts model will not play a big role in the future. This is in stark contrast to the aftermarket division, which also shares the belief that the revenue and profit will be impacted. However, this side believes that the business model will continue to be vital as it is a more established, proven model of generating profit compared to other ways that the product strategy team is suggesting to recoup, such as via subscription. The data analysis also revealed that there is no company strategy for the aftermarket business model, and how it is going to reinforce either of the two views.

I14 - "I don't think spare parts are going to be a massive part of our business."

Thus, one big challenge is that there is a lack of a single coherent strategic plan or vision for what the aftermarket or spare-part business model is going to be for the case company and for other OEMs. As of now, the aftermarket business and its own departments within are acting on a rather stand-alone basis, not being integrated as a whole with the strategy of the rest of the business. The data analysis shows that departments are siloed and have different agendas and KPIs, typically not reinforcing

each other's agenda. Having departments and divisions working siloed, means that there are different perceptions on what the key issues are going forward and how to solve them, and what role each specific department will have and the aftermarket as a whole. Departments are therefore working on trying to protect their own interests. There is a lack of direction and long-term initiatives to strengthen the aftermarket model and how to deal with key issues, such as the transition to BEVs, eliminate waste, increase customers satisfaction etc. Another internal challenge is that key operational issues that stretch cross-functionally; such as pricing, providing simple accessories, and developing service-offerings, which most all believe are crucial, are not being dealt with.

4.2 Opportunities in the aftermarket under Battery Electric Vehicle transition

Through conducting interviews with employees of the case company, MobilityGo, several opportunities emerged. Opportunities include maintenance-agreements, add-on services, accessories, Over the Air diagnostics, localizing supply chains, and re-focusing the car-subscription offering. Below these opportunities will be presented, supported by interview data and quotes of interviewees.

4.2.1 Develop service and maintenance-agreements

One opportunity presented by interviewees is to develop service and maintenance agreements. As previously presented in the findings, BEVs will require less service both in due to the service conducted once the car is in the workshop but also as a result of longer periods in between service. Interviewees shared their thoughts on mitigating this through creating an attractive service and maintenance-offering, where the customers pay a monthly fee and all service and maintenance is included. This offering provides the customer with a predictable cost of ownership as well as spreading the cost over a longer period instead of larger one-time fees. From the perspective of an OEM, this offering ensures that the customer conducts their maintenance at their partner workshops and also recurring contact points and the ability to negotiate better terms with workshops as the OEM negotiates terms for their whole fleet.

The structure of this offering would include all scheduled maintenance and possibly extras, such as replacements of wind-shield wipers and exchanging winter- summer tyres and potentially replacing these after a set amount of miles. This would allow the OEM to capture a larger part of the price by customers, as maintenance includes paying for labor to the workshop and maintenance parts to the OEM, while also benefiting the customer. Another key aspect of offering service and maintenance-agreements over longer periods of time is to increase customer retention. Interviewees shared that the customer retention for service noticeably drops off for each year after the warranty period. Through developing offerings that extend past the warranty period, OEMs could mitigate the current drop off and ensure retention for service.

I8 - "We as an OEM can go to our partner-workshops and negotiate a better price for labor costs and then get a bigger share of what the customers pay for service without an agreement. At the same time the partner-workshops have a stable recurring revenue and ensure that our customers come to their workshops and not non-partner workshops."

Data collected from interviews show that offering a service and maintenance package is of high priority and that there is potential to bundle several subscription services together in order to offer customers a care-free ownership. Bundling service packages with extended warranty and roadside assistance (RSA), customers have an all-inclusive package in regards of ownership.

I9 - " Offering a comprehensive service and maintenance package is key as customers want a hassle-free experience. That's where we see a lot of potential to add value."

4.2.2 Provide additional Add-on services

Interviewees believe that through developing a broad offering of add-on services, OEMs could recoup a part of the revenues lost due to the decrease of spare-parts and service. Going towards a service-based business model in terms of add-on services, OEMs could monetize premium features, accessories, and even charging potentially.

One interviewee discussed the possibility of offering premium features as a service rather than a one-time purchase at the point of sale, such as advanced climate control, capabilities of the infotainment system, remote features via app. This would be most applicable to premium features that include software specific capabilities as these could be turned on or off remotely by the OEM rather than require physical configuration. This could potentially increase the penetration of these features and also provide a new point of sales when these features are renewed, e.g annually or monthly. Interviewees shared that other OEMs have tried this with features such as seat heaters and received a lot of negative feedback from customers, they think that premium software applications and internet connectivity are the most suitable features for this type of offering. Internet connectivity and entertainment become an even more vital feature for BEVs as drivers will experience stand-still for longer durations than in an ICE when charging and hence need features that can entertain users in the meantime.

I14 - "With more content in the cars, more data will be consumed and currently we offer this free of charge to our customers. Our cars have Spotify and other apps that consume data, as well as the car serving as a WiFi-hotspot meaning that the passengers can be connected and consume data at the same time. This will be even more relevant with BEVs as there is more demand for entertainment in the car when drivers are stand-still charging and with video streaming in works even more data will be consumed"

Extended warranty and road-side assistance are two other potential add-on services that interviewees expressed interest in. Extended road-side assistance is particularly interesting as this service creates revenue both for the charge of the service but also to ensure that the car is brought to a partner-workshop that hence incurs further revenue for MobilityGo. Interviewees shared that extended warranty is common in other parts of the world such as the U.S, but the demand is not as high in Europe and Sweden. Through developing an attractive offering around extended warranty beyond the standard period that offers customers a sense of security and a predictable cost of ownership, interviewees state that OEMs can ensure that the customers conduct service and maintenance with partner workshops as well as profiting from the charge of extended warranty service.

I14 - "Extended warranty also unlocks other services such as a used-car label like Volvo select. As the extended warranty requires the customer to do service at partner

workshops and at given intervals, we as a reseller can ensure a clean service record of the car and assure the customer that they receive a car in good condition. Extended road-side assistance beyond our standard 2-year policy, is great in order to ensure that when the car is broken down it is fixed at a partner-workshop and stays in our ecosystem."

A new potential revenue stream for OEMs that is exclusive to BEVs is charging. Through developing partnerships with charging providers where drivers are referred to a specific charging provider through various incentives, OEMs could receive a kick-back for the charging of their fleet. Interviewees shared that these partnerships are in place for ICE vehicles and motor oil producers and believe that similar partnerships could be developed for charging. There is also an opportunity to develop partnerships with companies that produce and install charging infrastructure to homes. These stations can be sold at the point of purchase and OEMs can receive a commission per unit sold without investing in capabilities to produce their own.

I8 - "I believe that a potential offering to develop unique to BEVs are partnerships with charging providers. Having a partnership where we incentivize customers to charge at certain locations in exchange from getting a cut of the margin from the charging providers is something that would benefit all parties and that are currently in place for ICEs and motor-oil producers."

4.2.3 Expand accessories offerings

Accessories are another revenue stream that MobilityGo, as of now, have not yet developed extensively but interviewees believe that there are great opportunities for this. Selling original accessories is a great way to allow customers to customize their vehicle to satisfy potential further individual needs. Interviewees see potential in developing an accessory offering to recoup lost revenues from other aftermarket services that are believed to decline and believe that this would benefit both the OEM and workshops. Although not all accessories are specific to the BEV, there are specific accessories such as charging and dis-charging accessories.

I1 - *"One area that we [MobilityGo] could be better in are accessories. Currently, we have accessories such as tow bars, roof racks, winter tires and these things but if we look at other OEMs they have accessories as a business in itself. As we started off focusing on a subscription business model we kept our accessories offering simple and to satisfy the most basic needs, but now when we are going towards a wholesale approach we should look at expanding this."*

Interviewees of the study shared that developing service offerings around accessories are challenging as it becomes a difficult operation when customers cancel the service. Some accessories are integrated into the car and then it becomes costly and inefficient to remove these, plus the OEM is left with a used accessory that needs storing and a demand for further usage. Accessories that have seasonal demands, such as winter tires or roof box, are more applicable to servitization according to interviewees. Services that include storage between seasons and installation for the relevant seasons are a good way of selling the product as a service but also to keep a recurring relationship with the customer.

I10 - " Winter wheels are a really good accessory to sell as a service, especially in Sweden and Germany. Customers buy two sets of wheels for each season and for

many it is convenient to have them stored in-between usage and to have them installed when it is time to have them changed to summer or winter wheels. Here, we [MobilityGo] can sell this as a service in collaboration with dealers and workshops and even combine it with other offerings such as service-agreements."

Bundling accessories is something that interviewees proposed as an opportunity to create appealing offerings. One interviewee proposed to have kits of accessories for designated purposes, e.g. a dog owners accessory kit that includes a dog cage and rubber mats for the trunk. Another proposed bundle is a camping bundle, including roof box, bicycle rack, and tablet holders for the back seat, bundling everything necessary for a family camping trip.

4.2.4 Develop over the air diagnostic capabilities

Building capabilities upon over the air (OTA) diagnostics has been brought up by several interviewees. OTA means that data is collected and shared in real-time, remotely, with the OEM without the need for collecting this data physically when the car is in the workshops. This is enabled through the car being connected to the internet and having diagnostic capabilities integrated in the cars software. Having the car connected to the internet and the software of the vehicle integrated to OTA capabilities also allows OEMs to update software and fix minor bugs remotely. The increasing complexity but also connectivity that comes with BEVs poses a challenge as well as offering an opportunity to monitor the health of the vehicle in real time. OTA diagnostics enables the OEM to collect data on the wear and tear of different parts in real time. Thus this can be used to pre-empt longer vehicle stand-still through taking precautionary measures while the customer is in contact with workshops or to reach out to the customer and schedule preemptive maintenance.

I5 - " There is a real opportunity of developing offerings around proactive services through Over the air diagnostics in order to detect and potentially resolve issues remotely. This capability would also greatly increase the customer experience and the [MobilityGo] brand as this ensures a more seamless car ownership."

Interviewees see this as a big opportunity to enhance the customer experience of owning a BEV as well as optimizing routines for repairs and maintenance and hence increasing profits. As many OEMs act as fleet owners when customers are leasing their cars, optimizing maintenance costs through real-time monitoring via OTA diagnostics can have a big impact on the profitability of the leasing operation. One interviewee spoke about the opportunity to even sell OTA diagnostics as a premium service to other companies acting as fleet managers. One constraint that interviewees raised is General Data Protection Rights (GDPR) and constraints of utilizing data for specific vehicles, currently there are some regulations regarding this but with increased connectivity there will be increased regulations, argue the interviewees.

I14 - "OTA diagnostics have a great case for being sold as a service to fleet managers to enable them to have better oversight of their fleet. Developing this capability as a premium service to companies overseeing their own fleet and potentially bundling it with our car-sharing tech gives us a portfolio of B2B service offerings to further develop."

4.2.5 Supply chain localization

Interviewees shared that there are opportunities for supply chain localization. Localization, meaning that supply chains are being moved closer to local markets and decreasing distances between the different parts of the supply chain. Currently there are legislations and regulations regarding importing BEVs produced in China and their incumbent parts into the EU, especially affecting the batteries. These regulations require expensive certificates and increased safety including testing before shipments as well as increased actions of safety during transportation. The result is increased transportation costs for OEMs sourcing batteries and BEVs from China. Interviewees have raised this as one of the main concerns regarding the transition to BEVs as MobilityGo has their production of cars and also spare parts in China.

An opportunity raised by interviewees to circumvent legislation and reduce costs is local battery manufacturing plants, similar to the Chinese OEM BYD. By having manufacturing plants in Europe, it is possible to decrease transportation costs as well as shorten the lead time for batteries and better optimize storage. A strategy raised by interviewees is to import modules to a local manufacturing plant in order to still utilize the capabilities in China whilst being able to circumvent the regulations.

I6 -"If we [MobilityGo] can localize battery assembly in Europe through producing modules in China and doing the final assembly in a local manufacturing-plant, it would give us several advantages. We could reduce transportation costs and shorten lead time but also strengthen the supply-chain. At the same time we are able to comply with legislations and tariffs regarding electric vehicle batteries imported from China. By having the modules produced in China, we can still leverage our cost and expertise benefits already existing in China."

4.2.6 Pivot the subscription offering toward a premium offering

MobilityGo has from the start of the company focused on a subscription based model where customers can subscribe to their car for as short as only one month, but now in most recent years started to move to a wholesaler approach. The concept of MobilityGo subscription has been to offer customers a high quality and fully equipped car for a great price. This has been achieved through offering a limited number of options for ordering a car, reducing the number of options to only choosing between black and blue color-way as well as add-ons such as tow-bars and roof racks. Interviewees shared that MobilityGo's subscription model is what has enabled them to gain the market share that they have today but albeit at an in-sustainable pricing as their subscription fee has been equivalent to a leasing fee for similar segment cars. This has been an active strategy to utilize price penetration in order to speed-up capturing of market shares.

Another unique feature that MobilityGo has utilized is car-sharing, where car-owners can enable their car for other drivers to rent their car for a set amount of time. Interviewees shared that this feature springs out of the idea that the average car stands still for 96% of the time and through creating a possibility for car-owners to share their car, more people can benefit from each vehicle and the owner can earn money when not using it. Interviewees shared that MobilityGo as an OEM has benefitted of the car-sharing program through offering a more attractive car owning experience to their customers but they have also seen that many customers that have rented the cars through the car-sharing have proceeded to sign up for their own subscription car.

I14 -"One of the most effective ways for us [MobilityGo] to convert interest into sales is simply getting people into the product. Once someone drives a MobilityGo, they tend to really like it. That's where subscription and car sharing become powerful tools as they lower the threshold for trying the car. We've actually seen a clear pattern where customers create a MobilityGo account, use the car sharing service, and then go on to buy the car, often without ever visiting a dealer or booking a traditional test drive. In a sense, the car sharing experience becomes the test drive and we're getting paid for it. It's a great way to let people experience the quality and value of the product firsthand."

Interviewees see an opportunity in further developing the subscription model towards a high margin service offering. Measures have already been taken in order to increase the margin on the subscription offering and to offer this as a premium service and hence price it accordingly. Having the option to cancel the subscription with just once months' notice enables a more flexible car ownership but also incurs higher costs for the OEM resulting in a premium charge in comparison to fixed leasing terms for periods ranging from 24-36 months. By minimizing these costs through optimizing maintenance resulting in longer service intervals and also re-positioning the service as a premium offering, interviewees believe that subscription can be an alternative to the loss of aftermarket revenues that the transition from ICEs to BEVs incurs] .

I14 -"Subscription can be a high margin business for us [MobilityGo]. Unlike the traditional wholesale model, where revenue is shared with dealers and financing partners, subscription allows us to retain the full margin. We generate income through the monthly subscription, and once the car is used, we can resell it, enabling us to ensure that we can profit from the residual value. Through this, our revenue model is not just based on traditional aftersales or spare parts, but on the product itself and the services surrounding it."

5. Synthesis of findings: Automotive aftermarket business model in the era of electric vehicles

This chapter utilizes the Magic Triangle of Business Model Dimensions (magic triangle) framework to synthesize the findings (Gassmann et al., 2013). The magic triangle, presented extensively in the theoretical background, analyzes the business model of a company through examining four dimensions. These dimensions are, target customers, value proposition, revenue model, and value chain.

Through applying the framework, the findings are contextualized to better understand how the transition of Internal Combustion Engines (ICE) to Battery Electric Vehicles (BEV) affects the business model and to propose a new revised business model. The contents of this chapter are derived from the findings, although supplemented with existing literature where needed.

5.2 Target customers and Value proposition

The two first dimensions to examine in the magic triangle are the target customers and the value proposition. To give a better understanding and provide context to what each value proposition is aimed at. These two are presented in the same section with each value proposition being presented and then directly followed by the target-customer to this offering and what is important to think about when constructing the value proposition.

The value proposition describes what the company delivers to the customers which can include products, services or experiences. For the case company these propositions are hence the vehicles, services, and additional products. Understanding who a business's customers are is vital in designing a business model. Customers can include both Business to Business (B2B) customers and Business to Consumer (B2C) customers, hence ranging from customers to end-users.

To effectively analyze the target customers of the case company, the customers have been categorized into three different segments. The segmentation is based upon what type of offering the customers are buying, meaning either the BEV, services, or additional-products. By separating the offerings, each segment is analysed on its own and the target customers can be identified and analysed what value they are looking for, and tailor the value proposition accordingly. This segmentation reflects the case company’s diversified offerings and allows for a deeper analysis of customer needs and behaviour within each offering category.

Value proposition	Battery Electric Vehicle	Services	Additional-products
Customers	Dealerships End-users	End-users Fleet-owners	End-users Workshops
Envisioned future	- OEMs diversify from traditional ownership to flexible access	- Recurring, digital-first services - Increased relevance of fleet customers	- From spare-parts dependency to personalized accessory packages - Enhanced role of workshops in maintaining brand value
Key actions	- Strengthen D2C and digital channels - Treat dealerships as strategic partners - Adapt mobility offerings to urban, flexible users	- Develop premium and recurring service models - Form partnerships for charging solutions - Create full-service fleet packages	- Design accessory bundles by segment - Deepen workshop partnerships to ensure OEM part usage

Figure 5.1: Visualization of target customers and future actions

5.1.1 Battery Electric Vehicle

The first segment is the BEV, meaning the car as a product in itself and stand-alone from services or accessories. Analyzing the customers of the BEV, a further distinction to be made between the dealerships and end-users. The reason for this distinction is that the purpose and usage of the car are completely different. Selling the BEV to dealerships is about enabling resale though offering an attractive and profitable product, while selling direct to end-users is about providing the final product for personal or professional use.

The vehicles are offered to customers through four different ways of mobility: subscription, car-sharing, leasing and purchase. Calling it mobility instead of ownership better reflects the philosophy and brand identity of MobilityGo and in the case of subscription, car-sharing and leasing, what the customer pays for is mobility and not legal ownership.

The monthly-subscription offering is a “no-strings attached” way of owning a car. Customers subscribe to a MobilityGo car on a month-to-month basis, meaning that they can cancel and return their car with just one month's notice. The subscription fee includes the use of the car, insurance, service & maintenance, road tax, and roadside assistance which is everything the customers need for a smooth car access experience. This offering emphasizes ease of use, environmental consciousness, and access over ownership.

The car-sharing offering enables everyone with a MobilityGo car to list their own vehicle to the MobilityGo car-sharing platform through their app. Car owners can choose freely for what duration and at what cost their car is available for other users of the car-sharing platform to rent it. Users of the car-sharing platform have signed up and created a MobilityGo ID and can then see what cars are offered for sharing in their vicinity. In practice, the car-sharing works through cars being offered on the platform on terms set by the owners and potential renters sending a request to rent the car at these set terms, the owner can then choose to accept or decline the offer. Both the owner and the renter are insured through the MobilityGo insurance.

MobilityGo utilizes both dealerships and D2C sales channels for their leasing and selling proposition. Besides MobilityGo's philosophy of selling cars with a high standard of features and their car-sharing platform, MobilityGo does not differ from traditional OEMs in terms of their leasing and selling operations. This becomes increasingly important in the new landscape of the automotive aftermarket industry, following the transition to BEVs, which incurs less revenue and hence less net income in total for OEMs. Selling the BEV at a profit becomes a challenge that needs to be addressed in order for the industry to retain profitability levels similar to before.

5.1.1.1 Dealerships

Dealerships are key customers for the case company in their BEV offering and come with many benefits but also some drawbacks. Utilizing dealerships enables OEMs to outsource the Direct to Customer (D2C) sales process and keep the sales process at a B2B level. Using established dealership networks allow OEMs to reach local markets and faster market expansion than in the case of establishing their own retail infrastructure. This saves OEMs from large upfront investments and the time it takes to establish local relationships with customers. Selling B2B enables OEMs to sell larger volumes and in the case of dealerships, simplified logistics operations. Selling to dealerships allows OEMs to send larger shipments and cut out the need of establishing distribution channels all the way to the end-users. Dealerships often hold and manage inventory which reduces OEM warehousing and cash flow burden.

Through outsourcing the sales process, OEMs distance themselves from the end-customers which results in limited control over the customer experience at the point of sale. This distance also results in OEMs being dependent on the dealerships for customer data and understanding what drives the customer decision making at the point of sale. When using dealers OEMs give up part of their margin as they sell the BEVs at a wholesale price. Selling the car at a wholesale price does not only affect the margins but also allows for the dealerships to offer the BEV at a discount if needed, impacting the brand value and resale prices which in the long-term may affect the attractiveness of the BEV. Dealerships are a cost-efficient and scalable distribution model for OEMs but it comes with limited brand control and customer data, and margin erosion.

Analyzing dealerships as customers it is important to understand what their needs are and how to develop an attractive offering to satisfy those. Analyzing the business model of dealerships it is important to understand how they make money and what their costs are. Their profits come from vehicle sales margins, financing and insurance products, and maintenance. Fast inventory turnover is key for dealerships as inventory costs money and hurts the cash flow. Dealerships are highly sensitive to market demand and local competition meaning that if they do not have the most attractive offering they quickly become overstock which incurs large costs.

Developing an attractive offering to target dealerships involves creating an attractive vehicle but what might be more important is to support their operation. Creating an attractive vehicle that meets market demand is of course important but besides this OEMs can create an attractive offering around the vehicle through offering operational simplicity, marketing, training, and partnership. Offering operational simplicity through easy-to-use platforms for vehicle ordering, marketing material, and OEMs inventory visibility supports the dealership in their day to day operations.

Marketing is a key aspect in creating an attractive offering and through co-branded campaigns, including the OEM and the dealership, it is possible to drive direct foot traffic to the dealerships. Training the dealerships in understanding the car and who the intended end-users are, enables for a better customer experience and also enables the OEM to take more control over the experience and shape it to fit the brand. All these actions mentioned above enable the last and most important when developing the BEV as an offering to dealerships, building a strategic partnership. Through treating dealerships as strategic partners and not only customers, OEMs can strengthen the benefits and mitigate the drawbacks of utilizing dealerships. Trusting the dealers and having transparent two-way communication allows the dealerships to better understand the targets and expectations of the OEMs. From an OEM perspective this allows to shrink the distance to the end-users and better understand and influence the customer experience at the point of sale.

5.1.1.2 End-users

MobilityGo does not only utilize dealerships but has a D2C sales channel as well where they sell directly to the end-user. MobilityGo targets end-users through four different offerings structures, monthly-subscriptions, car-sharing, leasing, and purchasing the BEV. Through having this diversified offering for owning or driving their vehicles, MobilityGo are able to meet demands for car ownership in new ways contrary to the traditional OEMs.

The target customer for the subscription offering could be described as a modern, urban individual who prioritizes flexibility, convenience, and sustainability over traditional car ownership. The subscription customers usually live where it is inconvenient and costly to own a car and mobility needs vary over time. These customers see the vehicle as a mobility solution rather than having the emotional attachment to owning a car that traditionally occurs. Environmental consciousness is also a key trait in the subscription customers as many customers are open to utilizing MobilityGo's car sharing offering to make more efficient use of shared resources.

The target customers of car-sharing offering from the perspective of the car owners, are of everyone with a MobilityGo car but it is especially targeted towards those who "owns" a car through the subscription model. This goes in line with the idea that the subscription customers see the vehicle as a mobility solution rather than a owned asset which makes sharing the car when it's not used a great way to increase utilization but also to lower their own cost of ownership. From the renter perspective, the target customer of the car-sharing is similar to the one of the subscription model. The customer is usually an urban resident with a sustainability focus and value seeking in terms of their mobility needs.

The two last target customers for MobilityGo in terms of end-users are those who lease the car and who buy the car. These are the traditional customers of an OEM, although leasing the car differs in terms of legal ownership and set terms for accessing the car, these two customers are similar in terms of needs and behaviours.

Both leasing and buying customers share the characteristic that they prefer clear, predictable costs and long-term access to the vehicle. What sets the two customers apart are usually their planned usage and time horizon of ownership. Leasing comes with fixed terms as the OEM is the legal owner of the vehicle. These terms include mileage to be driven by the vehicle and also the duration of access to the car which usually is a

shorter to medium time horizon (2-4 years). Buying customers are the legal owner of the and hence are free to use it as they want but what is common is that they value control and ownership and usually have a longer time horizon of the ownership.

5.1.2 Services

The second segment derived from the case company's offerings is services. This includes all services related to owning the BEV and not services that incurs access to the car as these have been discussed in the previous chapter, meaning subscription-model and car sharing. The services discussed in these chapter target two types of customers, end-users and fleet owners.

Services are a key part of MobilityGo's value proposition and the findings show that with the effects from BEV transition, with decreasing revenue from maintenance and spare-parts sales, an extensive service offering is becoming increasingly important for OEMs. Service offerings can be developed around maintenance, infotainment, connectivity, charging, and RSA for the aftermarket.

Maintenance represents a key opportunity for MobilityGo to develop a value-adding service offering. As customers shift toward convenience and predictability in their mobility experience, there is a potential for structured maintenance packages. Offering scheduled maintenance as a paid add-on service would allow customers to avoid the hassle of managing service intervals and unexpected repair costs on their own. It would also create a recurring revenue stream for MobilityGo while strengthening customer retention through ongoing brand interaction after the point of sale. Besides revenue, this maintenance also offers a recurring meeting point and an opportunity to check the overall health of the vehicle. Having a recurring diagnostic of the BEV decreases the probability of hidden faults going unnoticed and at worst, resulting in the customer being stranded on the road-side. These aspects need to be accounted for when developing service offerings as not only value in terms of revenue is created but in this case, also in terms of maintaining a positive customer experience and brand perception.

Infotainment is another area for future service development, particularly as vehicle functions become increasingly software-defined. One promising opportunity identified in the findings is to shift from traditional one-time purchases at the point of sale to offering premium infotainment features as ongoing services.

Connectivity is another area where MobilityGo could expand its service offering. The findings show that data usage in the car is increasing, as more content and features rely on internet connectivity. Today, customers can use apps like Spotify and access the car's WiFi hotspot free of charge for the first two years, after that, MobilityGo carries the cost without any direct revenue. This would be especially relevant with BEVs, where drivers spend more time standing-still while charging and therefore have more need for in-car entertainment. As data-heavy features like video streaming become more common, a paid connectivity package could help meet customer expectations while also covering the rising cost of providing these services.

MobilityGo could explore new service offerings focusing on charging solution services tailored specifically to BEVs. The findings suggest that there is clear potential in forming partnerships with public charging providers, where customers are referred to specific networks through incentives such as discounts or integrated navigation. In return, MobilityGo could receive a share of the margin from each charging session.

There is also an opportunity to develop partnerships with home charging station providers, where MobilityGo acts as a reseller. By offering home chargers at the point of vehicle purchase or delivery and receiving a commission per unit sold, MobilityGo could expand its ecosystem and generate additional revenue without needing to develop its own hardware. These types of partnerships not only open up new income streams, but also strengthen the brand's ability to deliver a complete and convenient ownership experience for BEV customers.

Roadside assistance is identified in the findings as a promising opportunity for future service development. While MobilityGo currently offers RSA for a limited period, respondents highlighted the potential in offering an extended version as a paid add-on. This would not only provide customers with added peace of mind but also ensure that vehicles requiring assistance are consistently brought to partner workshops, thereby generating additional service revenue and keeping cars within the brand's ecosystem. From a strategic perspective, extended RSA supports both customer retention and aftermarket integration, allowing MobilityGo to maintain control over the service experience while reinforcing the brand's positioning around convenience and reliability. As customers increasingly expect seamless and dependable support services, developing a well-structured RSA offering could strengthen MobilityGo's overall value proposition and contribute to long-term brand loyalty.

5.1.2.1 End-users

End-users are key customers for OEMs in all different offerings and in the light of services, OEMs offer several services to enhance the customer experience of owning a car. These services include maintenance-agreements, financing and insurance, and services to enhance the in-car experience.

Maintenance-agreements is a service that the end-user pays for to include all maintenance required. For subscription or leasing customers this service is included in the fee and hence maintenance and scheduled service is free of charge at the workshop. For customers that buy their car, they can subscribe to a maintenance-agreement that allows them to serve their car for free instead of paying larger installments at the occasion of maintenance. The attractiveness of the maintenance-agreement lies in a predictable monthly cost instead of larger one-time payments, and usually the service includes extras such as free of charge exchange and housing of winter/summer tires.

Financing and insurance services are similar to the maintenance agreements included in the fee for subscription and leasing drivers but can be sold separately to those that purchase the car. These offerings are affected by high competition and customers are usually highly price sensitive as there is no emotional value to a financing or insurance plan given that all plans offer the same features. The advantage that OEMs have towards other competitors are that they already have the customer in their hands at the point of sale of the vehicle which makes it easier to offer add-on services that don't require the customer to search for other actors.

There is a wide range of services that OEMs can offer that enhances the experience of those driving and using the car. These services can include connectivity services, charging solutions, extended infotainment and climate control. These services can be included in the car either through the subscription or leasing fee or accounted for in the purchasing price. The target customers for in-car experience enhancement services are all MobilityGo cars but there is an opportunity to develop advanced services targeted

specifically towards BEV drivers. These services can be targeted to all BEV drivers, whether subscription, leasing or purchased vehicles, the services can be offered at an extra charge.

5.1.3.2 Fleet owners

When analyzing the customers of the case company in regards to their services offering, fleet owners are a customer that as of now isn't considered a target customer but with the BEV transition have a potential of becoming so. The attractiveness of fleet owners as a customer segment, as of now not developed, is supported by the findings and show potential for multiple services towards this customer segment. Fleet owners are business-oriented customers that acquire and operate a group of vehicles to support commercial activities. What characterises fleet owners as customers is a strong focus on cost efficiency, reliability and operational efficiency.

Given these characteristics there are several services that fit these needs and can enhance their operations. Presented in the findings, Over the Air (OTA) diagnostic capabilities are something that is in place as of now and will be further developed as the vehicles are becoming more and more connected. Developing services around these capabilities could allow fleet managers to monitor their fleet in real-time and pre-empt stand still. Combining OTA diagnostic services with maintenance-agreements and Road Side Assistance (RSA) creates an all-inclusive fleet owning service package that ensures cost efficiency, reliability and operational efficiency.

5.1.3 Additional products

The last segment of customers are those under the case companies offering additional products. These customers are end-users and workshops. The offering of additional products include first and foremost spare-parts and accessories.

Additional products such as accessories and spare parts are also part of MobilityGo's value proposition, and the findings show that this area could become more important going forward. With the shift to BEVs leading to lower revenue from traditional maintenance and spare parts, accessories and other add-ons could help OEMs recover some of that lost value. These types of products also allow customers to personalize their car and adapt it to different needs and lifestyles.

The findings suggest that there is potential in developing more tailored offerings, by creating accessory packages that match customer segments. Instead of offering a long list of individual add-ons, MobilityGo could create predefined packages based on different customer types, such as city drivers, families, or outdoor-focused users. This would make the accessory offer more relevant and easier for customers to navigate. One respondent pointed out that customers often feel overwhelmed when presented with too many options, and that clear packages would simplify the process and increase the chance of purchase. It also gives MobilityGo the opportunity to promote accessories more effectively during the purchase or onboarding stage, which could help increase both customer satisfaction and revenue.

5.1.3.1 End-users

In terms of additional products, end-users are to the largest extent customers of accessories and rarely spare-parts. In-direct, end-users do buy spare parts when doing maintenance check-ups but not in a way where the end-users come in direct contact of

buying them from the OEM. End-users are instead most interested in accessories, both those that they can choose to have mounted to the car at the point of sale, e.g tow-bar or roof racks, but also complementary accessories such as floor mats or dog cages.

As customers of accessories, end-users are driven by personalization and utility with the purpose of enhancing their own driving experience. Motivations for the purchase of accessories include convenience, aesthetics and functionality. OEMs need to appeal to both the utility of the accessory but also the emotional dimension when developing their offering.

5.1.3.2 Workshops

Workshops that provide maintenance and service to the vehicles are in terms of profit the most important customer of an OEM. Maintenance and scheduled service is a ground pillar in the personal vehicle industry. This is where workshops and dealerships get most of their long-term sustaining revenues from and also where OEMs sell spare parts which in most companies make up for the majority of the profits.

The products that are sold to workshops are spare-parts to the vehicle. The customer comes in for scheduled service within a given interval, usually every 12 months or 15,000 km depending on what is achieved first. During the scheduled service there is a protocol of what is exchanged depending on how long or far the car has been driven. Maintenance of non service protocol parts can be done if needed at an extra cost at the occasion of the scheduled service or when needed if urgent. In short, OEMs provide the workshop with the incumbent parts of service and maintenance, which is the offering that the OEM provides, and the workshop charges for the labor.

Workshops as a customer are dependent upon the OEM to offer the original spare-parts to serve the vehicles for the drivers. The relationship between workshops and OEMs are usually that of a partnership, meaning that workshops are presented as an extension of the OEM as an official Partner-workshop. This partnership allows the workshop to be certified as a trusted workshop and at the same time requires the workshop to only use original spare-parts sold by the OEM. The OEM needs to offer spare-parts at a price that makes the customer willing to pay for the maintenance whilst also allowing the partner-workshops to charge for labor and add a margin on the spare parts. If the price of maintenance is too high at the partner-workshop there is a risk that drivers use non-partner workshops. Non-partner workshops use the cheapest spare-parts available, whether these are original spare parts or not. This risk creates a mutual dependency between the OEM and the workshops as neither wants to risk that the customer takes their demand elsewhere. What characterises the relationship is collaboration, the OEM needs to provide spare-parts that are in stock and at a reasonable price, and the workshops need to offer a service and maintenance offering that is attractive enough to ensure that drivers use their workshop.

5.2 Value chain

The third dimension of the magic triangle described in Gassmann, Frankenberger, and Csik (2013) is the value chain and it is intended to describe how processes and value of the business model should be delivered to better align with the new intended business model. It will describe how the offerings or value proposition is created (from the second dimension, see 5.1).

With a pivoted business model, via different value propositions, and target customers, to be better aligned with the changing landscape that is more directed towards BEVs. It is essential that the value chain, which consists of the internal processes, to be aligned with the new business model. Below will be presented the most pressing challenges to address within the value chain and internally for the new business model for the aftermarket. This will be based on the challenges-part from the findings chapter. Following the presentation of the most prominent challenges to resolve will be a discussion on recommendations on how those challenges could be resolved. For this study two essential groups of challenges have been identified and will be discussed. These are battery-centric processes and organizational structure (see Figure 5.2), which each have further sub-categories.

Value Chain Activities			
Organizational structure		Battery-centric processes	
Problem Areas	Solutions	Addressable Challenges	Solutions
Strategic Misalignment	Develop Strategic Vision for the Aftermarket	Remanufacturing	Establish More Regional Reman Partners
Structural Misalignment	Include Aftermarket Leader in Executive Management Team	Logistic Challenges	Enable Direct or Local Sourcing
Strategic Goal Conflicts	Implement Matrix Organization	Capture Residual Value	Develop Strategy for End-of-Life Battery

Figure 5.2: Visualization of value chain improvement initiatives

5.2.1 Battery-centric processes

From the findings, to cope with key challenges in relation to the processes and value chain, three areas have been identified as essential to cope with; remanufacturing, logistics challenges, and capturing residual value in batteries. These are all challenges which are heavily influenced by the new dynamics of the automotive industry, highly dependent on batteries. All of these where brought forward in the findings chapter, under challenges.

5.2.1.1 Remanufacturing

The problems with the current remanufacturing (reman) set-up, for MobilityGo, are that such capabilities will most likely be much more important in the future and that the current strategy of outsourcing to a single supplier is slow and complicated from an administrative point of view. There should therefore, first and foremost, be a coherent and clear strategy to cope with these challenges, and a long-term establishment of what role reman will have for MobilityGo.

Reasoning and argumentation should be considered whether continued outsourcing makes sense or if reman will be such an essential element and that scale will soon be reached to make it economically feasible to build up internal capabilities. As of now, with the current volumes of reman work, it is not sufficient to justify developing

capabilities internally. In addition, there are more pressing challenges for the case company. It would most likely be a better option for MobilityGo to continue to outsource the reman capabilities to suppliers, rather than building up internal capabilities. Furthermore, developing it internally requires capabilities and resources which are not consistent with MobilityGo's current. There is also, despite interviewees being convinced that great reman capabilities will be of increased importance in the future, general uncertainty as to how important and what role such capabilities will have. Further increasing the risks associated with building up internal capabilities.

If chosen to outsource, like now, one prominent finding is that the current model has much waste in it. One example of this is that it was described how batteries are always being transported to the supplier's location and a new battery is sent as a replacement to the location. To decrease waste the most obvious recommendation is to ensure that workshops have the tools and capabilities to do as much reman in the workshops as possible to forgo unnecessary transportation to a central location for reman. A costly recommendation as in our findings it was described that special tools, facilities, and knowledge are typically needed for reman. Regardless, the design of batteries and engineering still makes it essential to have larger reman facilities for more advanced repair and servicing work.

Therefore, in addition to ensuring that workshops can do as much reman as possible, another consideration could be to look over the possibility of having multiple suppliers that can be used for reman work. For example, having a reman supplier in each country that MobilityGo operates in. This would most likely incur costs as the volume at the primary (or current) supplier will decrease but will at the same time decrease transportation and lead-time. Calculations thus have to be made whether cost savings in terms of transportation, time (potentially this can decrease time so much as not new batteries have to be sent but rather customers' broken batteries can be replaced shortly with the same battery only it has been remanufactured), and the lower administrative burden outweighs the cost savings of using a single supplier. There should also be consideration of long-term, having a single location for reman is feasible in the future, with increased volume, if not, considerations should be made to consider using multiple suppliers for reman. In Invest Northern Ireland (n.d.) it is described how using multiple suppliers have some advantages (can compare costs better, potential to cope with changing demands easier, and a supply chain less susceptible to disruptions) albeit with some disadvantages which include (usually better cooperation using a single supplier and more administrative work).

5.2.1.2 Logistical challenges

There are currently logistical flows that may not be optimal for a BEV centric aftermarket business model at the case company, MobilityGo. Some of the processes and flows could be pivoted to be more in line with the changing model. As of current, and described more thoroughly in 4.1.4, the case company is purchasing all spare parts from a sister company in China. Meaning that some spare parts need to be transported to China and then back, even if the supplier is next door to the case company's warehouse.

Potential solutions for a more optimal supply chain would be to look over whether it would be feasible to source parts from the suppliers of the spare parts individually, or most optimally utilize the purchasing power of the sister company but having all

transportation being shipped directly from the supplier directly to MobilityGo (not transported to China first). This is in line with the opportunity, sourcing more locally, presented in the findings chapter (4.2.5).

Such a pivot would most likely bring down the environmental footprint (less transportation) and be a more scalable model once the case company reaches a higher volume. Both objectives are in line with the case company's strategy of providing more sustainable transportation and the more scalable model is in line with the goal of growing as a company. Other benefits are relating to the cost side, as the suggestions would decrease transportation costs and provide a shorter lead time. Heller (2022) describes how a shorter lead time means that inventory can be reduced, and inventory turnover can be increased, which would free up capital employed in the business.

There should be considerations to which degree an approach of sourcing from suppliers locally would bring in additional administrative and logistical challenges, such as coordinating with warehouses and booking of shipments from multiple locations. One suggestion could therefore be to start off by sourcing the most local suppliers first, whose products are produced closest to the MobilityGo warehouse, or parts which are most expansive for transportation. Thus, another option could be to try and find a balance between purchasing some parts that makes most sense directly from suppliers, and the rest from the Chinese sister company.

Either one of the proposed recommendations here is to ensure a more optimal cost structure. Which is of essence with the changing nature of the aftermarket business model, with shrinking margins and lower revenues with the transition to BEVs for the aftermarket business.

5.2.1.3 Capturing residual value in batteries

The last point in regards to how to change the value chain of the business model is in relation to the findings chapter 4.1.2, which covers capturing residual value in batteries. As presented in the findings, there was not a clear strategy or vision of how to capture the value of obsolete batteries. There are also differences in opinions on how that is to be made. However, it should be noted that several interviewees agreed on the importance of having such a step in the value chain moving forward with the transition occurring from ICEs to BEVs. This value chain step is important because having such capabilities has the potential of increasing the residual value of the vehicle. Something that is important as this affects the total cost of ownership (TCO) calculations for leasing and subscription fees.

This value chain activity must start with determining which activity should be used. This could be either the view of what the findings suggested of having great recycling capabilities or finding alternative usage of batteries that are no longer feasible for serving in a vehicle. The third general option for obsolete batteries is remanufacturing, to restore and increase capacity. However, from the interviewees it was presented that reman is not feasible as of now (see 4.1.3).

Deciding on which strategy makes sense or if both are also of essence. There are certainly different capabilities required for each, such as in recycling a similar approach to reman should be determined if outsourced or developing capabilities internally makes the most economical and strategic sense in line with the rest of the organization,

same goes for finding alternative usage to batteries if such an approach makes sense. However, it is critical to choose one direction and strategy to start the development of end-of-life value chain activities for batteries.

In summary for internal processes, two subjects; remanufacturing and capturing residual value are in relation to new steps in the value chain that are needed for pivoting towards a BEV-centric aftermarket business model, and challenges displayed and experienced for the interviewees with the current business model. The last one, is in relation to ensuring that the logistical flow is as efficient and optimal, with the changing requirements and for a more cost-effective logistical flow to cope with shrinking margins and volumes.

5.2.1 Organizational structure

As presented in the findings chapter under 4.1.5, there was some internal misalignment between different departments and teams at the case company. The automotive industry, and the aftermarket for the automotive industry have inherent conflicting priorities between the various functions. This misalignment can have consequences in how key parts of the value chain will unfold given that, for example, key decision-makers have different opinions. Different functions not sharing the same strategic vision and direction of the company inherently bring out misalignment as well. The lack of internal alignment and functional separation could as presented in the findings slow down decision making and collaboration.

Collaborating and fast decision-making will be especially essential with this changing transition to BEVs. This in order to pivot the business model and resolve key issues quickly, as there are lots of new challenges and opportunities with the BEV transition in the aftermarket. There could therefore be an argument that in order to get key aspects right for this changing business model it requires a new way the organization has to work, as the BEV transition requires new elements. The organizational structure has been placed within the value chain chapter of the magic triangle, as alignment within the organization will be essential with a shifting business model.

One key finding was that there is also a lack of a strategic plan and vision for what role the aftermarket will have, and how to tackle the changes occurring in the business. This further compound the problems of misalignment as different teams are working on different individual targets. One recommendation is therefore to set up a strategic vision for the aftermarket that is in line with the rest of the company. This would enable departments to use the strategic plan as a guide for decision making, regardless of department. It is important that the strategy of the aftermarket is in line with the changing dynamics and requirements of the BEV transition, such as that BEVs require less frequent service where not as many parts are interchangeable, albeit some will increase such as replacement of brakes and the aftermarket model is more battery centric. As noted in the previous chapters, proposed changes in the business model, will be in regards to value chain activities (reman, logistics challenges, capturing residual value), target customers, and offerings with a strategy and plan that reflect the changes and pivots needed with the transition to BEVs.

Another finding in regards to the organizational structure is that there seems to be a lack of integration into the rest of the organization or that it could be enhanced. In the case company description (see 3.5), it was presented that there is no representative from

the aftermarket-side on the executive management team. Since the aftermarket business is still of such importance in the automotive industry, is experience much change, and is so interconnected with other areas. One recommendation is to have a member of the aftermarket team, or the head of the aftermarket join the executive management team. Something that could really help with alignment and ensuring that the aftermarket business gets high-level executive attention. This could also help with giving the aftermarket division more attention in key areas, which will soon be very much affected. Such as the development of service agreements talked about earlier. The aftermarket then would benefit, along with the rest of the organization, to have a member on the executive team where such decisions are reached to provide experience, expertise, and strategic input.

Another recommendation to resolve some organizational misalignment and functional separation is to ensure that all KPIs are as reinforcing as possible. However, sometimes in the automotive industry it is not possible. As presented in the findings, see 3.1.5, for example, building a vehicle that is optimal for production comes at the cost of making it less serviceable. Spearheading where KPIs are not reinforcing, a balance between conflicting targets has to be reached. One solution for such instances could potentially be to establish a matrix organization. Where the department or departments affected have a dual reporting line. This could be essentially important for the spare parts engineering team, which as noted in the findings chapter have a natural conflict of interest, as this department wants to ensure that vehicles are being serviced as quickly and cheaply as possible, compared the commercial aftermarket team, which are responsible for the profit and loss of the aftermarket division and wants to ensure a profitable operation. Both of these departments play a crucial role to ensure the future success for the company. In this instance the spare parts engineering manager could have a dual reporting line, reporting as current to the head of engineering and the head of aftermarket.

The thought is that a dual-reporting structure enables communication, discussions and ultimately alignment for situations where there are trade-offs that have to be made. In addition, there is more joint accountability, as of now, if either the spare parts engineering pushes too far on making service cheap and fast it will not necessarily affect this department directly. Whereas with a dual reporting structure and joint ownership, the spare parts engineering team together with the commercial aftermarket team would both feel the effects. A matrix organization could ensure that a proper and satisfied balance is reached between the departments with potentially less conflicts. It should be noted that a matrix organization has its flaws, in ChartHop (2023), disadvantages refer mostly to that a matrix organization can slow down decision-making as more parties have to approve and comprehend decisions. In addition, there can sometimes also be a confusing structure where it is hard to determine who has the authority and responsibility of what.

All of these challenges stem from that key issues need to be resolved fast and the proper balance between departments reaching for different goals is reached. As of now, some current challenges that were presented in the findings that cut across departments, such as service-agreements. Further reinforcing the need to great cross-functional organizational work.

5.3 Revenue model

The last dimension of the magic triangle summaries how the changing business model generates revenue, and how it is financially sound (Gassmann, Frankenberger, & Csik, 2014). As presented in the findings, the current margins, volumes, and therefore revenue and profit will be clearly impacted with the transition to BEVs. There have been identified ways to recoup some of the revenue and profit shortfalls, mainly stemming from lower sales of service-parts for the ICEs.

The drivers of this recouping process are intense focus on target customers via segmentation and expansion of products and services offering to better the value proposition. Which will be covered below via two sub-categories: Increasing revenues through additional services and increasing revenues through additional products. There are also ways by looking over the value chain, to ensure that the cost structure is at the most optimal for the transition occurring. Increasing the competitiveness of the cost structure would give room for margin expansion, generating higher return of profits. Which is covered lastly for this chapter along with a summarizing figure of the topics covered in the chapter (see Figure 5.3).

5.3.1 Increasing revenues through additional services

In regards to generating new sources of revenue, ideas based on the opportunities in the findings chapter were presented under Target customers & Value proposition (see 5.1). Related to targeting new or additional revenue sources were services and additional products. The economic realities for service offerings or the servitization of a business are described in Xyte (2024) are that it offers the possibility to integrate services to the core offering. Adding both value for the customer and a way of charging for it, such as for MobilityGo to be charging for connectivity services, where all vehicles already have the technological capabilities. Bundling services with core product offerings is also a way to broaden the customer base and increase the market reach for potential customers (Xyte, 2024). This type of market expansion and increased offerings via services usually also require less investments (Mebtoul (2023).

In addition, some of the offerings suggested via bundling allow the company to earn recurring revenues and prolong the customer contact point and interaction. An example of this is the maintenance and service agreements, which would allow MobilityGo to over a longer time period reap a more stable source of revenue. In Xyte (2024) another potential economic benefit of service offerings is that it offers the possibility of flexible pricing strategies. Where the customers' price can be easily adapted to fit the needs and values of customers, such as potentially offering service agreements at a lower monthly cost if the vehicle is in better shape. This could further expand the possible target group of customers, expand the market, and an ability to charge at an optimal level.

5.3.2 Increasing revenue with providing additional products

The financial argument for the offering of additional products for the aftermarket is that it has the potential to increase revenue, while offering customers products which are in high demand. Considering also that the case company, MobilityGo, has a relatively limited offering of additional products compared to other automotive manufacturers, expanding the accessory portfolio makes strong financial sense. This is low-hanging fruit as it requires minimal R&D investments, the existing sales channels can be used, and there is already a previously established customer relationship. Moreover, there is

a significant opportunity to collaborate with partner and sister automotive brands to achieve economies of scale in the production to achieve this at a low cost.

Many of such products, such as rubber floor mats or dog cages, usually have high profit margins as well. This initiative therefore has the possibility to increase non-spare parts revenue, with noticeable profits with relatively easy organizational efforts (e.g, there could be a strong argument that it is easier for an automotive company to produce and sell rubber floor mats to a customer who has already purchased a vehicle, than producing and selling a vehicle to a customer in the firsthand).

5.3.3 Optimizing the cost structure to achieve a higher profit yield

The opportunities presented in findings from the interviewees offer potential additional or new revenue streams through customer segmentation and pivoting the value proposition for each segmentation group. All this to recoup some of the revenue shortfall occurring with the transition from ICEs to BEVs for MobilityGo. There is, however, also a need to ensure that profit is generated from the business model, especially considering that as established previously, the aftermarket is a high-margin business which generally provides significant profits for OEMs. Considering that revenues can keep a similar level or shrink marginally, by injecting additional revenue streams. By then lowering the cost structure and base, similar levels of profits could potentially be realized. Despite the loss of high margin spare parts products such as filters and other service-parts.

From the value chain activities, mainly those related to the battery-centric processes, could, if executed directly potentially lower the cost structure. This was presented in 5.2, for the value chain. The main possibilities in regard to achieving a more competitive cost structure stems from ensuring that batteries are serviced as efficiently as possible via reman (see 5.2.1.1), solving logistical challenges (see 5.2.1.2) and capturing residual value for obsolete batteries (see 5.2.1.3). All of which could either lower the costs relating to transportation, administrative work, or increase the inventory turnover to free up capital employed. Either one of which would make a more competitive cost structure for MobilityGo. With a lower cost structure either higher margins can be realized for the organization, or it could potentially be used to lower the prices on the products and services offered to reach a larger customer base.

Another area of improvement is organizational alignment, as mentioned under the value chain chapter (see 5.2.1). Some of the areas of suggested improvements could potentially lead to cost savings, as a more effective organization for MobilityGo could be realized. Increased organizational alignment, through clear strategies and cross-functional working could also be a clear competitive advantage and an essential element in trying to achieve some of the suggested areas for increasing revenues and cost savings. This as many such initiatives cut across several functions, such as the development of service agreements, which requires the coordination of the aftermarket team and offer team.

Below are all the activities presented in a summarizing table (Figure 5.3).

Activity	Description	Examples	Benefits
Increasing revenue through additional services	Integrate services via bundling with core offering and existing products	• Connectivity services • Service and maintenance agreements	• Recurring revenue streams • Low investments • Prolonging customer contact point
Increasing revenue by providing additional products	Expanding the aftermarket accessories portfolio	• Rubber floor mats • Dog cages	• High demand and margin products • Minimal R&D • Use of existing sales channels
Optimizing the cost structure to achieve a higher profit yield	Removing waste and addressing key new value chain activities for BEVs, for a more competitive cost structure	• More reman partners • Enable direct/local sourcing • Develop strategy for end-of-life batteries	• Shorter lead-time • Lower transportation costs • Capital employed reduction
Outcome: More diversified revenue streams coupled with a more competitive cost structure which is better aligned with key activities for the BEV-centric future. Provides for a profitable aftermarket business model for BEVs.			

Figure 5.3: Summary of the revenue model for the BEV transition

Looking into the future, the aftermarket business will not be as profitable to OEMs and instead rather used as a reinforcing force for the brand. Ensuring that the customer experiences perceived quality via cheap and fast service and taking accountability in the new steps of the value chain, such as capturing value from obsolete batteries. There are ways to mitigate the impact, via further expansion into related products and services, and by focusing intently on the customer segmentation to find a unique value proposition to each segment.

The three dimensions mentioned above; value proposition, customer segmentation, and value chain, will all therefore play a crucial role in ensuring that the business model can be adapted to recoup and further reinforce the brand via a new solid, albeit not as profitable revenue model. A revenue model that is more diversified away from the spare parts sales to other revenue streams. Potentially offering a more stable model than previously, less susceptible to changing industry dynamics and other economic changes.

6. Conclusion

The aim of the research study was to investigate the implications on the business model of an Original Equipment Manufacturer (OEM) during the shift from Internal Combustion Engine (ICE) vehicles to Battery Electric Vehicles (BEVs). The focal point has been the OEM aftermarket segment, which is particularly exposed to disruption due with this transition. Utilizing the Magic Triangle of Business Model Dimensions framework to analyze the business model and applying it to a detailed case study of MobilityGo, a pseudonymized European OEM, the study explored how established practices are being challenged and how new strategic opportunities can be explored.

6.1 Theoretical contributions

The empirical findings of this study show that the transition to BEVs leads to a significant reduction in the demand for aftermarket services. Core revenue-generating activities such as oil changes, transmission maintenance, and traditional service of an ICE are becoming obsolete. This, in turn, affects labor hours and spare parts sales, which have historically provided significant revenue and profit for the aftermarket. These findings confirm previous research by Dombrowski and Engel (2013) that propose that this transition will have a direct negative financial impact for an OEM. Previous research was not done in the context of a case study in cooperation with an OEM, hence making this study unique and contributing to further development of current literature.

Another finding is the growing importance of batteries, both as a central component of the vehicle and as a logistical, safety, and business challenge. The findings suggest that OEMs struggle with managing the remanufacturing, and repurposing of high-voltage batteries. This process is often outsourced, which limits the OEM's ability to extract full value and ensure efficiency in operations. Especially with growing importance and potential scaling of volumes for such areas.

The findings of this thesis show that internal challenges stemming from organizational silos and misaligned between departments are present in the business model innovation. Engineering, logistics, and commercial teams are not always unified in their strategic priorities, which hinders the development of forward-looking solutions and creates frictions in strategic execution. This study therefore contributes to existing literature on intra-organizational challenges in business model innovation in industry transformations.

Theoretically, this research study contributes to the literature on business model innovation by applying the Magic Triangle framework in a new empirical context. It showcases how BEVs instigate shifts across all four dimensions of the business model: target customers, value proposition, value chain, and revenue model. There is a gap in existing research of business model innovations in regards to the automotive industry's transition from ICE to BEV. This gap is highlighted in chapter 2.2.4, where it is presented that existing research has neither explored business model innovation in this context, nor with the frameworks applied in this research study (Sundin, et al, 2021) (Sholichah, Sutopo, 2020).

6.2 Practical implications

From a managerial standpoint, the findings underline the need for proactive adaptation. OEMs are encouraged to strategically reconfigure their aftermarket operations by adopting a more service- and software-oriented business logic. The data suggests that such transformation must be cross-functional in nature, departments cannot operate in isolation if the company is to remain competitive.

The study also identifies emerging opportunities, including bundling services into subscription-based maintenance-agreements, expanding into the digital domain with software-based services, and refining accessory offerings based on customer profiles. These strategic moves could help OEMs recover part of the lost value from declining spare parts sales, while also enhancing customer loyalty and engagement. Furthermore, such initiatives would provide a more diversified source of revenue.

What becomes prevalent is the need to pivot from a legacy revenue model that relies on spare parts and maintenance sales and instead develop a business model that utilizes subscription services. Servitizing and developing current offerings to a value adding services for the customers is crucial to sustain revenues after the point of sale of the BEV.

6.3 Limitations and further research

Several limitations should be acknowledged, the study is based on a single case study, limiting the generalizability of the findings. The applicability of these findings to other OEMs could potentially be limited due to generalizability between different companies and the scope of this study being limited to one actor. Especially when looking at OEMs in different geographical settings and market segments. The study relies solely on qualitative interview data, which is inherently shaped by the perspectives and experiences of the informants. While steps were taken to ensure data triangulation and thematic saturation, the absence of quantitative performance metrics limits the ability to empirically verify some data points.

Continuing on the foundation laid by this thesis, several areas for further research are interesting. Comparative studies involving multiple OEMs from different geographical regions or market segments could provide broader insights into how structural and geographical variables influence business model innovation in response to BEV adoption.

There is also potential for ecosystem-level research that includes other key stakeholders in the aftermarket, such as workshops, dealers, and more. Understanding how these actors interact, compete, or collaborate with OEMs could offer a more holistic view of value creation and the impact on these actors from the transition from ICEs to BEVs. Finally, using quantitative models or simulations to assess the financial implications of transitioning from ICE to BEV aftermarket structures would be a valuable addition. Such models could help OEMs forecast revenue trajectories, test strategic alternatives, and assess long-term profitability under different market and regulatory scenarios.

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Appendix

Interview Guide

Start of with introduction with background of us and the Study

1. **Can we record this interview?**

Participant's Background:
1. What is your current role?
- Please elaborate on your responsibilities and the nature of your role.
2. What is your previous experience?
3. What is your connection to spare parts and electric vehicles (EVs)?
4. Have you noticed any changes in your role with the transition to EVs?
- Have you received any training or similar support related to this transition?

Spare Parts:
1. Can you explain how MobilityGo's spare parts network operates?
2. Walk me through the process—for example, if a customer needs to replace a bumper.
3. How does your structure differ from others?
- What advantages or disadvantages does your structure have compared to others?
4. Is there any importance to after-sales services beyond revenue generation?
- For example, in terms of marketing or customer service.

Transition to EVs:
1. What have been the biggest challenges or changes in your role during the transition to EVs?
2. Have there been any opportunities or aspects that have become easier in your role?
3. What changes or trends do you foresee as a result of this transition?
4. With the EVs having more parts integrated into modules and being more connected, are there possibilities of locking out third party spare part manufacturers and third party service providers?

Demand for Service and Spare Parts:
1. Do you anticipate any specific services or spare parts increasing or decreasing in demand due to the transition to EVs?
2. What are the critical challenges for spare parts in the EV transition?
3. How are you working to mitigate them?
Literature highlights five critical challenges for spare parts in the EV transition:
- Decrease in working parts
- Fewer additional units
- Longer service intervals
- Immature battery technology
- Limited self-maintenance

3. Have you noticed or do you expect any changes in demand, revenues, or costs for your business?

- *Literature shows that 24% of aftermarket revenue contributes to 54% of profits (80% when insurance is included). Does this align with your experience?*

4. What transformations do you think are required to adapt to EVs within the aftermarket?

- Investments, strategic changes, training, or development.

Battery-Related Questions:

1. What challenges related to the battery do you foresee?

Literature suggests that batteries will pose significant challenges in aftersales:

- *Capturing residual value from old batteries*
- *Ensuring guaranteed replacement after approximately 8 years*
- *High costs related to logistics and warehousing*

How is MobilityGo addressing these challenges?

2. The three key pillars are reuse, remanufacture, and recycle.

- Which strategy does MobilityGo focus on?
- Which do you think will be the most critical in the future?
- What are the specific challenges or opportunities related to these strategies?

3. Are there any challenges or opportunities to handle the logistics of the battery?

- In terms of safety, costly inventory, and transportation.

Alternative Revenue Streams and Business Models:

1. What does your business model look like, including revenue streams?

2. You operate on a subscription model.

- How does this differ from traditional sales in terms of spare parts?
- How do you think this will evolve, or need to evolve, to adapt to EV sales?

3. Are there any new services or products emerging?

- Product-oriented (e.g., financing, insurance)
- Service-oriented (e.g., mobility guarantees, car sharing, fleet concepts, transport services)

4. Literature suggests an alternative revenue source due to the aftermarket decline with EVs: upfront service bundles (USBs)

- These cover most services over a predetermined period.
- Do you see this as a viable alternative?
- What advantages or disadvantages could such an approach have?

5. EVs having a greater value depreciation, does that cause problems with creating a competitive leasing offering?

Final Question:

Do you have any recommendations for interesting questions to ask or people to interview regarding the EV transition?

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