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Achieving Strategic Improvements by Tackling Supply Chain Uncertainty

A lead time management analysis of an automotive manufacturer

Master's Thesis in Quality and Operations Management

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Abstract

The automotive value chain is changing, and with that, the role of dealerships. Traditionally, car manufacturers have sold their cars to dealerships who, in turn, have been responsible for selling the cars to, and interacting with, the end customers. However, with new direct-to-consumer business models relying on online sales, the role of the dealership has transitioned from being a sales actor to becoming an intermediary preparing the cars and performing the final handover. Consequently, the car manufacturer's supply chain has extended to include accountability of the dealerships' operations and the lead time resulting from these operations.

Based on internal investigations, the case company has identified what it perceives as unnecessarily long lead times in the dealership part of the supply chain. Therefore, the aim of this study was to provide insights and give recommendations regarding how to cope with the lead times and operations at the dealership stage of the case company's supply chain. Accordingly, the study intended to support the work of improving supply chain management at the case company.

The methodology of the study consisted of a preliminary analysis of the lead time issue, coupled with interviewing select market representatives. Subsequently, a survey was sent out to the same markets' dealerships to make a complete and comprehensive assessment of the situation before a final analysis, together with relevant literature, of the results, was conducted. The approach was inspired by grounded theory in that it relied on empirical data without taking a starting point in a possible explanation.

The analysis of the results points to uncertainties in lead times and quality, information flow, and customer adaptation, together with a lack of standardisation and directives. In particular, supply chain uncertainty prompts a trade-off between lead time and customer satisfaction since premature handover agreements with customers may result in rescheduling and, thus, risk customer dissatisfaction. The study shows that currently, customer satisfaction is prioritised in the trade-off.

To conclude, the study results in five recommendations: *Reduce uncertainties by improving reliability in lead times and quality*, *Develop guidelines on how to handle the trade-off between lead times and customer satisfaction*, *Investigate the lead time consequences of customer adaptation*, *Introduce coherent directives across markets*, and *Standardise market processes.*

Keywords: Customer Satisfaction, Dealership, Information Flow, Lead Time, Supply Chain, Supply Chain Management, Supply Chain Uncertainty.

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List of Acronyms

Below is the list of acronyms that have been used throughout this thesis listed in alphabetical order:

CRM	Customer Relationship Management
D2C	Direct-to-Consumer
EIS	External Information System
EMEA	Europe, the Middle East, and Africa
ETA	Estimated Time of Arrival
HO	Handover
HQ	Headquarters
IIS	Internal Information System
KPI	Key Performance Indicator
MC	Market Coordinator
MS	Market Storage
SC	Supply Chain
SCM	Supply Chain Management
TPL	Third-Party Logistics

Nomenclature

Below is relevant nomenclature that occur in the thesis.

Carrier – External partner responsible for transports.

Dealership – Internal/external partner at the last step of the supply chain, responsible for final preparations and customer handover of the cars.

Dwell – Time where product/process is stationary in the supply chain.

European Hub (EH) – The hub in which the cars arrive to the EMEA market area from factory.

Lead Time – Referring to time a particular process, such as a transport, takes.

Market Storage (MS) – The location in each market where cars are delivered before being transported to the dealerships.

Market Coordinator (MC) – Employee being responsible for aspects such as planning, order, and distribution at a particular market.

Workshop Activities (WA) – Workshop activities where the cars are inspected and prepared for handover.

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1 Introduction

The automotive industry and its value chain are undergoing immense change, proving impactful in all parts of the industry's core characteristics. Not only are cars transitioning from combustion engines to electric motors, but the consumers' approach is changing as well (Morrissey, Stricker, Tsang, & Zayer, 2017). According to Turner and Williams (2005), traditionally, cars have been sold to end customers through dealerships, *"ensuring that vehicles are financed by dealers as soon as they are produced"* (p. 449). However, Morrissey et al. (2017) argues that the purchasing process of the automotive industry is becoming influenced by the digital era and is increasingly shifting to an online setting. Tesla is one example of an automotive manufacturer that has taken a radical step and moved to online sales only, utilising its distribution network and physical stores instead of relying on external dealerships (Higgins and Roberts, 2017).

1.1 Background

The case company of this study has decided on another approach than both the traditional automotive manufacturers and the more novel one of Tesla. The company under investigation only offers sales of its cars on its website, thus having a complete online purchasing experience with a direct-to-consumer strategy. However, instead of relying on an internal network of physical stores, it utilises dealerships as intermediaries that handle the final preparations and handover of the cars to end customers. This results in prolonged ownership and control of both the processes and the finished cars far longer than in comparison to the traditional supply chain of the automotive industry.

From this background, the role of dealerships in the company's value chain differs from that of the traditional structure, where dealerships are responsible for marketing and selling cars in addition to final distribution. Instead, in the context of the case company, the dealerships are responsible for the final preparations of the cars, such as installing software updates, cleaning, installing tow bars, and the final handover to the customer. Furthermore, when analysing the company's supply chain, a more significant proportion than desirable of the total unwanted downtime in the supply chain can be found at the dealership stage. In addition, there are differences in the lead time between individual dealerships and between markets. This discrepancy is most likely a consequence of factors found both in the company's and in the dealerships' internal operations. For example, different practices and prioritisation at dealerships, information flow between dealerships and the case company, and the geographical location of individual dealerships in conjunction with the overall supply chain, are all plausible explanations.

The unwanted downtime and varying lead times at the dealership stage, combined with the case company's direct-to-consumer strategy, urge for investigation and improvement of the dealership stage in the supply chain. Thus, by investigating the lead time at the dealership stage, recommendations for improvements can be found, resulting in strategic improvements in the company's direct-to-consumer supply chain.

1.2 Aim of the Report

The report aims to investigate, analyse, provide insights, and give recommendations regarding lead times and operations at the dealership stage of the case company's supply chain to support the work of improving supply chain operations.

1.3 Literature

The literature framework will be presented as a literature review based on academic literature, business journals, and consultancy reports relevant to the issue under investigation. Material related to both the automotive industry and similar industries where the supply chain and utilisation of dealerships are comparable will be used.

1.4 Research Questions

1. What are the underlying reasons for lead time at the dealership stage?
2. What actions are recommended to reduce downtime and improve lead time?

1.5 Limitations

The research focuses on the dealership stage of nine EMEA markets that the case company operates within. The reason for choosing these markets are that they have similar supply chain structures and ways of operating. This setup is the most suitable as it makes results and the subsequent discussion points applicable throughout the studied markets. Moreover, since the study is conducted at a higher level of abstraction regarding the analysis of the company's supply chain, no detailed analysis will be made for each market investigated.

The study solely covers cars of the most common sales types, namely Private and Fleet. These sales types cover most of the company's sales volume and has the most common supply chain structure, thus being of most relevance to the study. Lastly, the study is limited to cars with handovers between 1 January 2021 until March 2022.

2
Analytical Framework

The following chapter presents an analytical framework through a literature review where key concepts and theories relevant to the study are presented. First, concepts of the supply chain are presented and defined. Following is a description of the roles and liabilities of intermediaries within the supply chain, the importance of collaboration, and how to uphold successful partnerships. Then, the three levels of uncertainty found in supply chains and provides suggestions for counteracting these are presented. Lastly, theory related to the end customer is accounted for, with concepts of customer satisfaction being defined, and the impact of expectations and desires being presented.

2.1 Supply Chain

The definition of a company's supply chain is broader than solely its logistics flows. According to Lambert and Cooper (2000), supply chain management (SCM) refers to the management, understanding, and integration of both logistics and key business processes across a company's whole supply chain. The authors mention product flow, Customer Relationship Management (CRM), procurement, and demand management as a few examples of business processes included in the supply chain. Furthermore, SCM includes intra, and inter organisational integration and coordination with a multitude of independent organisations (Cooper, Lambert, & Pagh, 1997). These interactions are, according to the authors, enabled by bidirectional flows of products and information across the organisations and stages in the supply chain. Cooper et al. (1997) further argue that the goals of SCM and the whole supply chain are *"...providing high customer value with an appropriate use of resources, and to build competitive chain advantages"* (p. 4). Thus, while logistics is part of the supply chain, it only refers to the part of SCM that regards the controlling of flows and storage of products, services, and information from the starting point to the consumer while meeting customer requirements (Lambert and Cooper, 2000).

2.1.1 Intermediaries Within the Supply Chain

Due to the specialised abilities needed within a supply chain, manufacturers often outsource activities between manufacturing and the end consumer to intermediary companies (Gadde, 2014). Further, by outsourcing to companies focused on key activities in the supply chain, the manufacturer avoids the high costs of setting up physical distribution networks and utilises intermediaries' ability to have better efficiency and performance due to focusing on one specialised function (Gadde, 2014). Another important aspect is that intermediaries have other priorities than manufacturers, which strengthens their position. As Gadde (2014) points out, *"another modification that strengthened the role of intermediaries was that they increasingly turned their attention towards their customers, rather than supporting manufacturers' operations"* (p. 624).

The role of the intermediary can vary, and Gadde (2014) refers to, being relevant for this study, specialists within physical distribution; third party logistics providers (TPL). These companies can either have control of the whole logistics flow or be responsible for selected activities such as transportation services between certain physical points (carriers) (Lieb, 1992).

While there are positive aspects of using a TPL, such as lower costs, increased flexibility, better customer service, and improved utilisation, there are important implications and challenges associated with outsourcing as well (Lieb, 1992). Some of these include aspects for the manufacturer, such as less contact with customers and a loss of control (Lieb, 1992); however, there are also more structural perspectives linked to the TPLs that need to be addressed. Gadde and Hulthén (2009) argue that with more firms in the supply chain, coordinating just in time deliveries and synchronisation of activities can become problematic. This requires coordination between the boundaries of firms, which demands information systems that can provide ample information exchange between companies (Gadde and Hulthén, 2009). The authors further explain that having well-functioning relationships between buyers and TPLs are also a vital aspect of ensuring coordination between the companies. Another aspect of outsourcing is the lack of control of the processes for the buyer. To mitigate the lack of control, Gadde and Hulthén (2009) argue that the buyer can use contracts to stipulate within what conditions the TPL should work. However, the authors also mention that it is important to not solely use contracts as they constrain the TPL's operations, as well as risk becoming redundant as business environments change and thus need to be adapted. Instead, Gadde and Hulthén (2009) emphasise that the focus should be on creating buyer-TPL relationships.

Because SCM includes management across several business processes, information flow, and collaboration between the actors, the end consumers become an inherent and important aspect of a successful supply chain (Lambert and Cooper, 2000). Having a successful collaboration between actors is mentioned as one of the essential aspects of creating an effective supply chain (Horvath, 2001).

2.1.2 Collaboration Within the Supply Chain

According to Horvath (2001), the success of a supply chain is dependent on collaboration between all participants, whatever their size and position. The author further describes that all companies in the supply chain must understand and conform to their customers and suppliers to optimize their operations. Moreover, Min et al. (2005) explain that successful collaboration between companies in a supply chain is dependent on extensive information sharing as it improves decision making and, thus, supply chain efficiency. Communication is also seen as one of the key ingredients in thriving partnerships (Tuten and Urban, 2001). Moreover, sharing forecasting data is essential for successful collaboration as it affects scheduling and inventory management (Min et al., 2005). Additionally, Min et al. (2005) mention the importance of sharing market planning as it helps create joint new business development between actors in the supply chain.

With a more effective supply chain, responsiveness and flexibility can be improved and thus, better adapt to fluctuates and uncertainties in the supply and demand (Horvath, 2001). Lewis and Talalayevsky (2004) add that shortened information chains and a more effective information flow can help in optimising the decision making process. Barratt (2004) argues that improved and increased collaboration in the supply chain can result in serious improvements in a company's operations; however, such a beneficial collaboration might be difficult to achieve. The author mentions several different areas that are crucial for success in supply chain collaboration, such as culture, communication and understanding, mutual benefits, and information exchange, amongst many others. For example, information flow is deemed highly important, and Barratt (2004) states that *"information, particularly the transparency and quality of information flows, play an important part in many accounts of supply chain developments"* (p. 36).

To be able to uphold a successful collaboration between actors in the supply chain, Barratt (2004) mentions a multitude of criteria that are required, such as process alignment, supply chain metrics, and the role of technology. With supply chain metrics, Barratt (2004) refers to the need of the actors in the supply chain to share metrics and information with each other to prevent possible bottlenecks from occurring; however, this sometimes proves difficult due to the *"complexity of overlapping supply chains"* (p. 38). Furthermore, in terms of the requirement of technology, Barratt (2004) argues that the collaborating organisations need to be on board with what information is needed to be shared across inter organisational platforms to facilitate effective communication. Min et al. (2005) adds the need for formal agreements regarding aspects such as performance metrics and objectives to help facilitate effective and successful collaboration.

According to Kwon and Suh (2004), it is important to establish a high degree of trust between the actors collaborating in a supply chain. Kwon and Suh (2004) argue that increased trust in the relationships among supply chain partners results in a lower cost of transactions and state that *"trust exists when one party has confidence in an exchange partner's reliability and integrity"* (p. 5). Furthermore, Fawcett, Jones, & Fawcett (2012) argue that the level of actual capability in the intended function of delivery, together with the right intent, are the most important aspects of building trust between actors in the supply chain. Thus, trust can be said to consist of two dimensions, namely performance capability and commitment capability, together forming a bridge between limited trust and collaborative trust (Fawcett et al., 2012). Fawcett et al. (2012) state that *"when asked to define trust, manager's number one response was the 'ability to perform to promise'"* (p. 166), yet again emphasising the importance of actual capability in one's intended function.

2.1.3 Uncertainty Within the Supply Chain

Supply chain uncertainty can emerge due to factors laying both inside the focal company's control, namely its internal operations and adjacent partners in the the supply chain, but also due to external reasons, such as competition and overall economic climate (Simangunsong, Hendry, & Stevenson, 2012). More specifically, Simangunsong et al. (2012) mention factors such as organisational culture, supplier issues, and irregular demand as causes of supply chain uncertainty. The definition by Flynn, Koufteros, & Lu (2016) is not as wide, arguing that supply chain uncertainty can consist of aspects such as unreliability in lead times or quality of products, but also in insufficient information shared by the collaborating partners. Flynn et al. (2016) continue to define three different levels of uncertainty in the supply chain, being *Micro Level*, *Meso Level*, and *Macro Level*.

Micro Level uncertainty refers to the simplest form of uncertainty, such as delays in delivery or discrepancies in volume, aspects that have a mathematical and thus quantifiable nature (Flynn et al., 2016). This type of uncertainty, Flynn et al. (2016) argue, *"can have serious supply chain implications because of demand amplification and bracing behaviour"* (p. 6). This phenomenon is commonly known as the bullwhip effect, where the bracing due to uncertainties in, for example, volume accelerates through the chain (Flynn et al., 2016).

The next form of uncertainty is Meso Level, and it refers to information, or rather the lack of information causing uncertainty in supply chain collaboration (Flynn et al., 2016). As there are often many different actors involved in the supply chain, Flynn et al. (2016) argue that information shared between them might be insufficient and even be in the self-interest of certain of them not to share particular information or knowledge. Aspects critical to reducing the Meso-Level uncertainty in a supply chain can be the speed of the information shared and the ability to transfer it without allowing distortion by opinions (Flynn et al., 2016). In summary, Meso-Level uncertainty can thus, according to Flynn et al. (2016), be defined *as the difference between the amount of information needed by a supply chain member and the amount already possessed"* (p. 9).

Lastly, Macro Level uncertainty refers to highly complex circumstances where there are no standard methods or approaches to deal with the situation arising (Flynn et al., 2016). According to Flynn et al. (2016), such circumstances can be, for example, *"sudden shifts in customer demand or when an organization encounters a natural disaster"* (p. 9). Flynn et al. (2016) further argue that Macro Level uncertainty is marked by differences in how actors in the supply chain collaboration interpret and perceive the situation, and due to the low volume of such events, it is difficult for organisations to learn how to effectively deal with them.

Nevertheless, Flynn et al. (2016) suggest methods of dealing with the different types of uncertainties that might occur in the supply chain. Flynn et al. (2016) propose supply chain integration as the main solution, stating that *"both micro, and meso level uncertainty can be reduced through the acquisition, dissemination and assessment of timely and accurate information"* (p. 21). Integration in the supply chain can be built by recurring activities coordinated amongst its members, resulting in an increase in aspects such as trust and culture within the collaboration (Flynn et al., 2016). Further, Simangunsong et al. (2012) argue that there are two different options to deal with supply chain uncertainty, either to reduce the uncertainty or to cope with the uncertainty. Strategies to reduce supply chain uncertainty can, according to Simangunsong et al. (2012), for instance be to utilise more lean operations, or to increase the collaboration and integration in the supply chain, the latter in accordance with Flynn et al. (2016). On the other hand, Simangunsong et al. (2012) argue that strategies to cope with uncertainty can be, for example, to utilise postponement of decisions, or to manage lead time uncertainty by *"quoting of a longer lead time for customer orders compared with the expected manufacturing lead times"* (p. 4503).

2.1.4 Incentives Within the Supply Chain

For long term collaboration to be successful, it is important that the goals are aligned and that there are incentives for actors across the supply chain that are beneficial for the chain as a whole (Narayanan and Raman, 2004). However, the authors also state, *"every firm behaves in ways that maximize its own interest, but companies assume, wrongly, that when they do so, they also maximize the supply chain's interest"* (p. 2). In order to align the goals of the chain and to deal with the issue of insufficient incentives, Narayanan and Raman (2004) suggest that one effective method is to rewrite and re-negotiate the contracts between the partners, where the correct behaviour is to be incentivised. Regarding the payment between actors in the supply chain, Narayanan and Raman (2004) argue that *"changing how, rather than how much"* (p. 7) is the correct call for improving contracts and thus encourages the right actions. According to Norrman and Naslund (2019), there is sometimes a discrepancy between reward, and incentive structures that award certain behaviour, and the overarching goals of an organisation, as the structures tend to encourage specific actions in specific functions, thus not being in coherence with the organisation as a whole. Here, Norrman and Naslund (2019) argue that the incentives and rewards could instead be structured concerning what is beneficial for the larger system, thus avoiding sub-optimisation and improving collaboration. Furthermore, Norrman and Naslund (2019) state that *"the firms with the best practices work simultaneously with external and internal integration"* (p. 132), arguing for the connection between the separate forms of integration and the connection to strategic alignment and incentives.

2.2 Customer Satisfaction

According to Coye (2004), the end customer's expectations of the upcoming transaction play a pivotal role in order to achieve customer satisfaction. Coye (2004) states that *"customer satisfaction [...] is seen as a function of the comparison between a customer's expectations and his/her perception of actual service"* (p. 54), suggesting that in order to achieve customer satisfaction, there needs to be coherence between what the consumer anticipates, and what is in reality delivered and perceived. The expectations that the customer possesses before entering the situation where the service or product is delivered can originate from, for example, promotional materials and what has been said by others who have experienced the service or product (Coye, 2004). Furthermore, Coye (2004) makes a distinction between what the customer expects and what the customer actually desires, as these two concepts might not be aligned. Both the expectations and the desires of the customer can be altered during the delivery of the product and service, and are thus not set in stone beforehand (Coye, 2004). Coye (2004) mentions an example of a passenger about to board an airplane, where the customer's expectations are changed by, for example, queues, suggesting that the plane might not leave at the correct time. The desires, on the other hand, in this example by Coye (2004), is that the customer is to arrive at the correct location at the correct time; however, this desire can be changed by the airline suggesting a reward for a passenger that gives up its seat. Coye (2004) states that *"on entering any delivery system, the customer is subject to a potentially vast number of cues that may influence his/her assessment of the ongoing process"* (p. 61).

Regarding lead times and customer satisfaction, Ho and Zheng (2004) discusses a method where the customer is promised a delivery date where the product or service is to be delivered at the latest, and if this promise is not held, some sort of reward is given to the customer. In their article, Ho and Zheng (2004), refers to this concept as a *"delivery time commitment"*, and such a commitment must be balanced between the resources it requires to be upheld and how the customers will view upon it. So and Song (1998) state that such a commitment can be used in a company's marketing as leverage towards its competitors. With such a method, Ho and Zheng (2004) argue, the customer expectation can be met, which, as stated in Coye (2004), is a vital ingredient for success in customer satisfaction.

2.3 Business Models

According to Schafer, Smith, & Linder (2005), the definition of a business model varies among actors in the corporate world but also in academia. However, by analysing and synthesising existing definitions, Shafer et al. (2005) suggest the following definition for a business model; *"a representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network"* (p. 202). The authors further argue that it is essential for the components of the business model to have unique characteristics and thus stand out from business models developed by competitors. Schiavi and Behr (2018) discuss the importance of renewing and innovating business models to stay competitive, especially in an environment marked by disruptive businesses and technologies, stating that *"innovation in business models has become a key factor to be considered in the strategies of companies"* (p. 349). Liu, Liu, & Gu (2021) emphasise the importance of business model design to succeed in the marketplace and argue that both business models focusing on increasing the efficiency of transactions in the value chain, and business models aiming to find novel methods to interact with stakeholders, resulting in an increase in operational performance for the company. It is further suggested to facilitate integration with stakeholders in the supply chain to leverage the business model and thus increase its benefit to the firm (Liu et al., 2021).

3

Supply Chain Structure

The following chapter aims to illustrate the supply chain structure of the studied company for the EMEA market. However, many details in the original chapter was classified by the case company and thus a more general and shortened description of the supply chain structure is presented below.

3.1 Physical Supply Chain Structure

The case company's cars are manufactured offshore, and then transported to the EMEA market, arriving at the company's European Hub (EH). From the EH, the cars are transported to a Market Storage (MS) located at each individual market. At each market, a Market Coordinator (MC) is responsible for handling the physical flow of the cars, as well as coordinating the contact between the case company and the dealerships. After arrival at the MS and released for delivery by the MC, the cars are sent to the dealerships. The structure is visualised in Figure 3.1. At the dealerships, the cars are inspected and prepared before the handover is performed. Furthermore, the company offers different sales types, with Private, intended for private customers, and Fleet, intended for leasing companies.

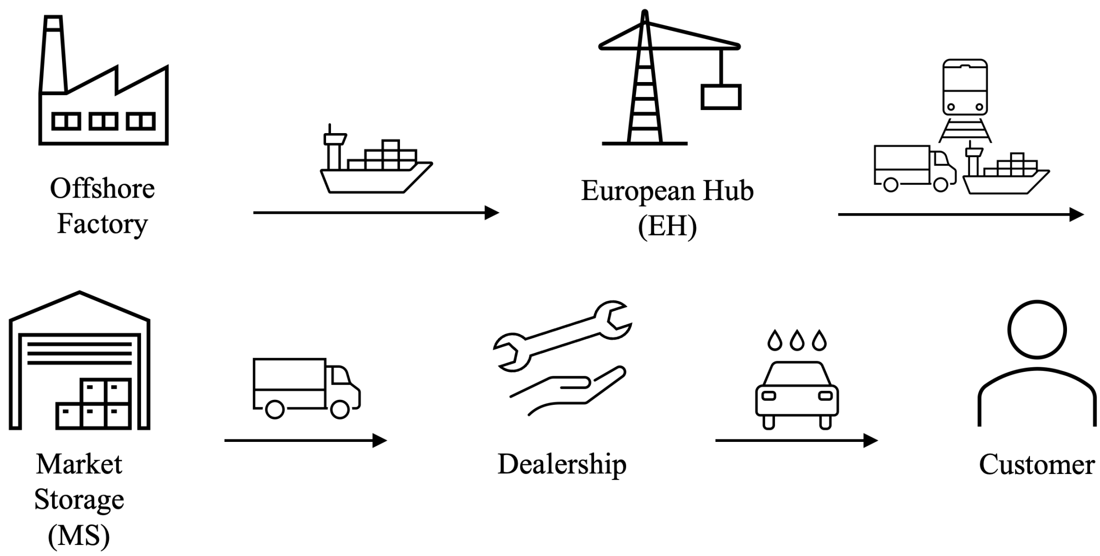

Figure 3.1: Case company's European physical supply chain.

3.2 Dealership Operations

In the case company's supply chain, the dealerships' most important responsibilities are proposing and booking handover dates with the end customers and to perform the final handover of the car. On top of this, dealerships are responsible for performing workshop activities, as seen in Figure 3.2, such as installation of extras, quality inspection, and the overall final preparations of the cars before the handover.

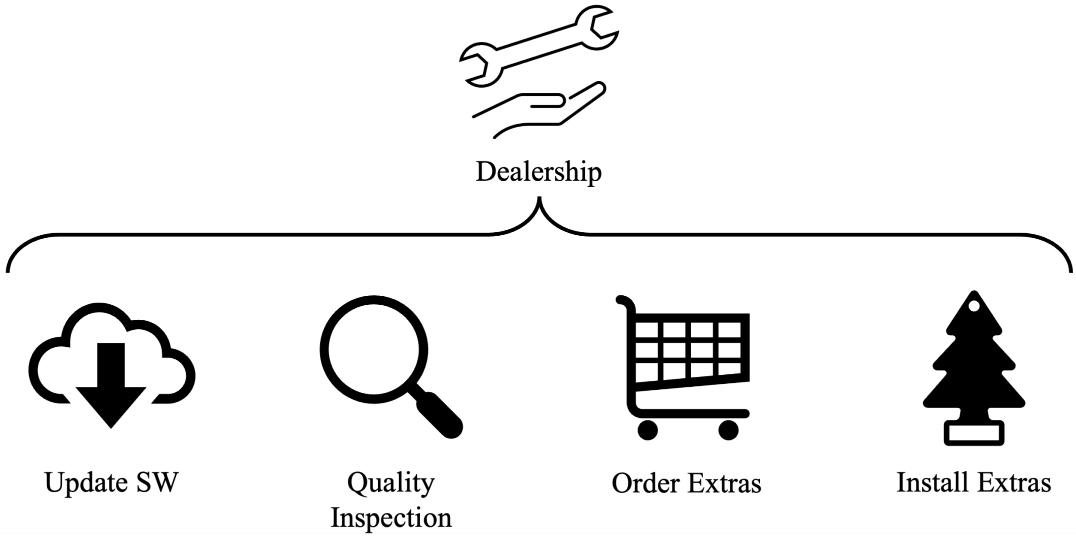

Figure 3.2: Illustration of the dealership's operations.

3.3 Information Flow

The case company utilises two different systems for the information flow in the supply chain. These are referred to as the internal information system (IIS) and the external information system (EIS). The IIS is accessible for employees at the case company, most importantly the logistics division and the MCs. In the IIS, data regarding the cars in transit can be found, such as in what location the car is, for example at the EH, as well as the calculated ETA. Dealerships do not have access to the IIS and thus relies on the EIS. In the EIS, information such as the ETA and extras required for each car can be found. The purpose of the EIS is to allow the dealerships to plan their activities accordingly.

One important aspect of the ETA is that it is not being updated dynamically. Instead, the ETA is only updated at specific points in the supply chain, as visualised in Figure 6.1, found on page 42. This results in periods where the ETA is not updated frequently, adding uncertainty in the data.

3.4 Markets with an Alternative Supply Chain

While the majority of the studied markets have a similar supply chain structure, two of the markets have an alternative structure.

Market M6 has a higher amount of dealerships than other markets due to local regulations of how far a car can be driven before no longer being classified as new. This is mostly relevant for Fleet sales types, as leasing companies expect their cars to be classified as new at time of delivery.

Another market with an alternative supply chain structure is market M9. Instead of performing the initial quality inspection and eventual repairs at the dealerships, market M9 utilises its Market Storage for these activities. Thus, before the cars are sent to the dealerships, quality inspection, and if required, repairs, are conducted centrally.

4
Methodology

The following chapter describes the methodology used in the study. The chapter starts with an overview of the research strategy, followed by a description on how the study's exploratory phase was conducted. Next, the qualitative phase is described. This is followed by the quantitative phase, including a survey sent to the investigated company's partner dealerships. Lastly, ethics in the study are discussed.

4.1 Research Strategy

Because of a lack in predetermined hypotheses for the causes of the variation in lead times and unwanted downtime at the dealership stage, the study had an inductive approach and aimed to investigate and provide potential explanations. Bell, Bryman, & Harley (2019) explain that inductive research aims to form a theory as the study's outcome, in contrast to a deductive study where the researchers work from an initial theory and conduct research to prove or dismiss this theory. Moreover, the study was iterative, allowing it to adapt and become more specific as theories were formed. Having a flexible subject and adapting to new discoveries is inherent in inductive research and part of its nature (Bell et al., 2019).

The study used mixed methods, combining qualitative and quantitative research strategies. Mixed methods can direct the research and prepare for the following research steps, and qualitative and quantitative strategies can be combined in several ways. Bell et al. (2019) give an example of a mixed method design used in this research: exploratory sequential design (see Figure 4.1).

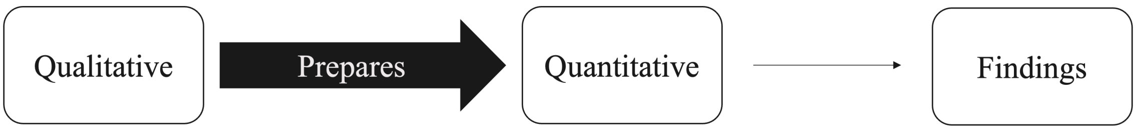

Figure 4.1: Exploratory sequential design (Inspired by Figure 27.2 by Bell et al. (2019) (p. 573).

4.2 Exploratory Phase

The study began with an exploratory phase with the aim to frame the problem and understand relevant concepts. Because of the unique business model and thus, the limited literature on the subject, the exploratory phase consisted of quantitative data formatting using historical data, and internal meetings with employees of the case company. Finally, the exploratory phase aimed to provide an understanding of current company processes and create a basis for the questions in the interview template for the MCs.

4.2.1 Lead Time Data Collection and Formatting

Initially, data formatting was conducted with existing lead time data. The supply chain database consisted of raw data of lead times for all cars with handover dates from the 1st of January 2021 until the 28th of February 2022. Further, the researchers acquired handover booking data to find EH, and MS lead time data and potential connections between handover booking time and dealership lead times. Finally, the data was formatted using Microsoft Excel to find connections and correlations. The formatting was done to outline average dealership lead times at both market, and dealership levels, finding whether specific markets and individual dealerships perform better or worse than others, as well as logistics lead times that can be used to compare with interpretations from MCs and dealerships. Comparing dealerships and markets aimed to establish a relative position among the subjects under investigation. Moreover, pre constructed dealership KPIs were used as inspiration for areas and patterns to look further into.

4.2.2 Lead Time Data Analysis

Parallel with the data analysis of the lead time data, meetings were held internally with case company employees within several relevant departments. While some departments were focused on delivery and handovers, others were more focused on physical logistic flows. During the meetings, findings from the data formatting were presented and discussed. The meetings aimed for the researchers to find whether their conclusions from the data formatting were the same as the employees or if they had other conclusions and, if so, understand why. Moreover, during the meetings, clarifications were made regarding processes and the *modus operandi* at the case company, providing a basic understanding of its supply chain structure.

4.3 Qualitative Phase

After finishing the exploratory phase, having found patterns in the data linked with dealership lead time and discussed these findings with employees at the case company's HQ, the qualitative phase of the study began. This phase consisted of semi structured interviews with market coordinators in the nine studied EMEA markets. Having conducted all interviews, a data analysis was done according to grounded theory.

4.3.1 Qualitative Data Collection

The MC interviews aimed to better understand the reasons for performance differences between markets and dealerships. Further, the interviews gave the researchers a more thorough understanding of the company-to-dealership relationship at the market level and whether the investigated company has specific directives working with the dealerships.

The number of interviewees was decided through fixed purposive sampling, where the interviewees are decided beforehand based on certain criteria (Bell et al., 2019). According to the authors, there is not any specified minimum limit to the required number of interviews in a qualitative study. Instead, they mention that the sample size of interviewees varies from study to study when using purposive sampling and that one indicator of a "big enough" sample size is saturation in insights. For this study, the number of interviewees were determined by the number of MCs in the studied EMEA markets. As each market has one allocated MC, the number of interviewees were the same as the number of markets. In total, nine interviews were held. While all MCs have the same role and responsibilities at their respective markets, their experience and time at the company varied. However, since supply chain structures and routines should be the same for all markets, the same questions were used regardless of previous experience.

All interviews were held remotely over Microsoft Teams. This was mainly due to convenience as the MCs are located across all of Europe. Further, since the outbreak of the Covid-19 pandemic, using remote meeting tools, such as Microsoft Teams, have become a routine for many employees at the company. Thus, conducting the meetings remotely allowed the interviewees to be within a familiar setting, as is recommended by Bell et al. (2019) when conducting interviews. Moreover, all interviews were video recorded using Microsoft Teams built in recording function with the consent of the interviewees. This allowed the researchers to watch the interview again, should any answers be unclear. Further, the interviews were transcribed either during the interviews by one of the researchers, or afterwards with the help of the recordings. The length of the interviews varied between 30 minutes and one hour depending on the length of the interviewee's answers. This is normal when conducting qualitative interviews according to Bell et al. (2019). Lastly, while the majority of interviews were held in English, two interviews were held in Swedish due to convenience. These interviews' answers were translated into English afterwards.

Because the interviews aimed to gather qualitative insights into the study, the interviews were conducted in a semistructured fashion. According to Wholey, Hatry, & Newcomer (2010), semi structured interviews are suitable for adding depth and supplementing preparation for surveys as they can give in depth information about a specific subject. Further, using semi structured interviews is useful as they allow the researchers to have structured questions, whilst at the same time also allowing for asking more in depth questions adhoc in response to the interviewee's answers (Bell et al., 2019). However, it is important to note that using semi structured interviews also has disadvantages that need to be considered. Wholey et al. (2010) mention that preparing, setting up, and conducting interviews are time consuming, and thus, semi structured interviews may not be suitable if many interviews need to be held. Another potential disadvantage is the need for the interviewer to concentrate on both listening to and understanding the interviewee while simultaneously responding to the interviewee's answers and ensuring that there is enough time to go through all the questions (Wengraf, 2001). These considerations were managed through both researchers being present. While one interviewer was responsible for the structured questions and keeping time, the other interviewer had a greater focus on responding to the interviewee.

During the interviews, the researchers created and used an interview template, see Appendix B.1. The interview template followed the ground rules for constructing an interview guide for semi structured interviews, as described by Bell et al. (2019). This included to avoid having too specific questions, not asking leading questions and having a clear structure with a few pre determined topics. Moreover, in accordance with Bell et al. (2019), the researchers used the order the interview template's question order to the extent that felt appropriate. If the interviewee deviated from the questions and a natural follow up question was one destined for a later section of the interview, it was asked where appropriate. Further, the interview template was based on the conclusions and findings from the exploratory phase and discussions with the employees at the case company's HQ. In addition, the questions were designed to clarify the thoughts and reflections made during previous analyses and better understand differences in the case company's markets.

4.3.2 Data Analysis of the Interviews

After conducting the interviews, data analysis was made according to grounded theory, as described by Bell et al. (2019). Grounded theory was chosen as the framework of analysing data as it allows for the data to be broken into categories and concepts (Bell et al., 2019). Another aspect to choosing grounded theory, described by the authors, is that it allows for keeping statements and answers intact. This makes it easier to compare categories as well as dividing larger categories into smaller, more specific ones.

The interviews were transcribed, decoded and broken down to individual answer components on post it notes with unique colours for each interviewee. All components were then arranged into clusters with similar contexts by having the researchers individually cluster the post it notes to avoid influencing each other, in accordance with Bell et al. (2019). The clustering was done without having any predetermined labels. Instead, following the clustering, the researchers conducted iterative discussions where categories and subareas were decided. The data analysis aimed to find connections and patterns between markets and break these down into areas that could be further analysed. Further, the data analysis was done to find whether conclusions could be drawn regarding lead times and operations at the dealership stage in the supply chain and compare these to the results in the exploratory phase. Moreover, the data analysis was used to support the survey as it helped the researchers to understand the areas that were interesting to investigate at the dealership level.

4.4 Quantitative Phase

A survey was constructed after finishing the qualitative phase. It was designed around the theories formed regarding variances in lead times from the previous phases. The survey aimed to give the dealers' perspective on subjects and areas found during the interviews with the MCs. The reason for using a survey to gather data and insights was to be able to reach as many dealerships as possible since it is both quicker and easier to use a survey than conducting individual interviews, as described by Bell et al. (2019). However, as the authors also mention, there are some inherent disadvantages to using surveys as well. These include the inability to prompt respondents if they have difficulty understanding the questions and that surveys have lower response rates than interviews due to the risk of questionnaire fatigue and lack of pressure. To combat the associated disadvantages, the survey was kept as short as possible.

To ensure the best possible response rate, the researchers asked the MCs to distribute the survey to the dealerships in their respective markets rather than the researchers distributing it themselves. The survey was distributed via e mail to the MCs. Distributing to the dealerships, the MCs choose themselves the distribution method that suited them best at their respective markets. Having the MCs distribute the survey allowed them to discuss and explain the survey during meetings with the dealerships, Moreover, it allowed them to remind the dealerships to complete the survey and follow up on those who had not answered it within the given time frame of one week. All of these measures resulted in a response rate of approximately 45%. Compared to the response rates of 10% to 25% for surveys mentioned by Bell et al. (2019), a response rate of 45% is to be considered very good. Thus, while interviews would have been preferred for collecting dealership data, with the time required for semi structured interviews, as stated by Wholey et al. (2010), it would be difficult to have conducted interviews with a sufficient number of dealerships.

The questions were generalised to function across all markets in the study to gather as similar and useful findings as possible. For the same reason, to avoid misinterpretations of questions, the survey was solely made in English. It consisted of 25, mainly closed, questions with a consistent format throughout the whole survey. Furthermore, the questions were of a quantitative format as the survey aimed to give a better understanding of the previously formed theories and findings. For the entire list of questions, see Appendix B.2. When designing the survey, guidelines provided in Bell et al. (2019) were taken into consideration. Further, meetings with HQ employees were held to discuss the survey and provide thoughts and considerations to give the survey the best possible outcome. Finally, before the survey was sent out to the recipients, a pilot study to test the format and questions was conducted with one dealership who gave feedback on the survey. The results and feedback from the pilot study showed that the survey was easily understandable and gave a good response. Bell et al. (2019) argue for the importance of a pilot study due to its capability of testing, such as if the questions are well understood by the recipient or if the answers make sense and are usable. The survey's results were finally analysed and compared to the answers from the interviews in the qualitative phase.

After conducting the survey, its results were analysed and compared to the results from the interviews in the qualitative phase. This was done to outline similarities and differences between dealerships' and MCs' interpretations. The results were divided into the same categories formed during the qualitative phase.

4.5 Ethics

According to Bell et al. (2019), ethics is a crucial and integral part of the research process, and the following areas are defined: *Harm to participants, Lack of informed consent, Invasion of privacy,* and *Deception*. *Harm to participants* was, in this study, prevented by, for example, making the study results anonymous and not disclosing individual dealers. To deal with the issue of *lack of informed consent*, it was important to inform both employees at the case company and at the dealerships, the purpose of the research conducted and why their involvement was needed. *Invasion of privacy* can be avoided by, for example, according to Bell et al. (2019), allowing people not to answer questions or to cancel the interview, thus *"treat each case sensitively and individually, giving respondents a genuine opportunity to withdraw"* (p. 123). When conducting interviews, this was adhered to by never pushing any of the interviewees to answer anything they would feel uncomfortable with. Moreover, the survey started with an introductory text specifically stated that the results are anonymous and that no questions were mandatory to answer, see Appendix B.2. Finally, regarding *deception*, Bell et al. (2019) argue that researchers should not deceive regarding the true purpose of their projects. This was avoided in the study by the researchers introducing the respondents, in both the interviews and the survey, to what the study aimed to achieve and its purpose.

5
Results

First, the chapter presents the results from the exploratory phase. This is followed by the results from the qualitative phase through presenting the outcome from the interviews with the MCs. Lastly, the results from the quantitative phase, and the dealership survey are presented. There will thus be three separate sections to account for the study's results.

5.1 Results from the Exploratory Phase

The exploratory phase aimed to give a better understanding of the underlying reason for lead times at the dealership stage. This stage of the study consisted of analysing historical lead time data. The results from the exploratory phase consists of outcomes regarding average dealership lead times and reliability of the ETA.

5.1.1 Average Dealership Lead Times

When comparing lead times at the dealership stage between markets, as seen in Figure 5.1, it is clear that there are differences to consider and thus that improvements can be made. Worth noting is that market M9 is missing in the figure due to differences in lead time reporting structure. When comparing supply chain lead times and causes for increased dealership lead times, there are mainly two factors that are found using the data.

The first factor is handover booking time in relation to when the car has arrived at the dealership. From the data, it was found that the earlier the handover is booked compared to when the car arrives at the dealership, the earlier the handover will occur. Thus, booking handover earlier reduces dealership lead time. Calculating the relationship between the handover booking time dealership lead times shows that it has a correlation of approximately 0.74. Thus, there is a relatively strong positive correlation between handover booking time and dealership lead time.

The second factor is handover rescheduling, where a clear connection exists between rescheduling handovers and longer dealership lead times. On a market area average, for all cars that have had a handover within the time frame of the study, compared to not rescheduling, rescheduling causes a rather significant increase in lead time. Out of all the cars investigated, a not insignificant number of them have had their handovers rescheduled. However, important to note is that the data does not show whether the dealerships cause the rescheduling or if it occurs due to customer requests. This is because, at the time of the study, this is not differentiated in the case company's internal data.

Figure 5.1: Graph of average dealership lead times at the case company's EMEA markets.

5.1.2 ETA Reliability

Because the historical data used in the analysis only contain the latest updated iteration of the ETA (from the MS to the dealership), the reliability of the lead times between EH and MS cannot be analysed. Although, from the internal meetings, the logistics team acknowledge that the ETA is not reliable from EH to the MSs. This perception was later also confirmed by the MCs and the dealerships. From MS to dealerships, however, there exists data that can be analysed. It shows that, for the majority of markets, the delivery precision is within the company goals most of the time and thus that the delivery precision is good. However, nearly all markets have experienced periods of unreliable delivery precision, but overall, especially towards the more recent data points, the delivery precision has improved to highly satisfactory levels.

5.2 Results from the Interviews with MCs

From the interviews, it is evident that some aspects of the market operations are market-specific, and some are shared across all EMEA markets. The shared aspects mainly depend on a centralised supply chain or the internal information system.

Meanwhile, the market specific aspects are more related to market routines, regulations, volume, and culture. However, for all markets, four key issues are identified; *Supply Chain*, *Dealership Operations*, *Handover*, and *Internal Operations*. These issues are accounted for separately in their subsequent subsections below. Important to note is that the following sections account for the MCs' perspectives on the issues of matter, and the results presented in this chapter are not supported by quantitative data. Additionally, within certain subjects, the MCs have proposals for improvements to the current *modus operandi*. In areas where the MCs give proposals, these are presented at the end of that specific area's section.

To each identified area of issue, key insights from each market can be found in Appendix A.

5.2.1 Supply Chain - MC

This section gives an overview of the results within the area of the supply chain. During the interviews, three separate areas within the supply chain were identified. These are accounted for separately below. These areas consists of *ETA*, *Transportation Between EH - MS & MS - Dealership*, and *Information Flow*.

ETA

A majority of markets express that it would be beneficial if the ETA was updated more frequently as it would enhance its usability. Several MCs mention that dealerships sometimes choose not to use the ETA in planning their workshop activities and operations due to it being inaccurate occasionally. In many markets, dealerships have previously booked slots both for workshop activities and for the customer handover in accordance with the ETA. However, this resulted in them sometimes having to reschedule the cars that did not arrive on the promised date, thus delaying the customer handover and increasing the lead time at the dealership stage. As rescheduling of workshop and handover slots are undesirable from the dealerships' perspective, the occasional inaccuracy of the ETA has resulted in a majority of the dealerships not trusting the ETA and thus, awaiting the arrival on site of the car before booking any activities. One of the MCs, in market M5, also mentions that they calculate delivery dates on their own after the car has reached the MS, rather than using the ETA. Nevertheless, in markets M1 and M3, they do not express any immediate concern regarding the ETA; however, the reason for this is unknown.

Proposals from the MCs

When asking what actions and changes would reduce the lead time at the dealership stage, most of the MCs state that improving the accuracy and reliability of the ETA would be beneficial for operations. As stated above, the MC in market M3 does not bring up any acute issues with the ETA, but argues, together with the MC in market M4, that with a more accurate ETA, the workshop activities and the handover could be booked earlier. The MC in market M6 also states that *"the reliability of information is a very significant part of where we can improve."* Furthermore, three of the MCs explicitly mention that it would be an improvement if the ETA stated not only what day the car is supposed to arrive but also what time of day, as this would ease the planning of activities at the dealerships even more.

Transportation Between EH - MS & MS - Dealership

Regarding the lead times from EH to the respective MS in each market, there is yet again coherence amongst a majority of the interviewees that sometimes, the lead times are not reliable. Some of the MCs express that this can be caused by, for example, capacity issues in EH, but overall the reason why seem to be unclear according to the MCs. However, again, the MCs in markets M1 and M3 address no acute issues with the ETA and express that the lead times from EH to MS are at least semi reliable. Regarding lead times from MS to the dealership sites, there is, on the other hand, a majority of the MCs that believe that the lead times are reliable and also that the dealerships are satisfied with the carriers. In this case, the MCs in markets M2, M6, and M8 express concerns with the reliability. For instance, the MC in market M7 expresses that the lead times are usually reliable; however, that the dealerships are sceptical of the carriers and might perceive lead times and reliability as worse than they actually are.

Proposals from the MCs
According to the MC in market M6, currently there seems to be no system in place where the carriers receive a penalty if there are delays or if some cars disappear, suggesting that some sort of system of penalties should be introduced. This is emphasised by the statement; *"Sometimes they forget there is a car in a yard, and it is not being penalised in any way [...] should not work like that."* The same MC further argues that the carriers should be more precise and reliable. The MCs in markets M5 and M8 also mention the issue of the cars arriving in batches, where the MC in market M8 proposes more smooth operations and the MC in market M5 that the cars should be released from MS more than only on one specific day each week, as measures to reduce lead time at the dealership stage.

Information Flow

The MCs express different opinions regarding the continuous information flow between dealerships, the case company, and carriers, occurring in the daily operations. For some markets, the MCs are satisfied with the supply chain information and communication from the carriers, and they believe that the dealerships for their respective markets are too. However, for other markets, the MCs express concern with lacking information from the carriers, an opinion that, according to them, is shared with the dealerships as well. For some markets, the MC contacts the dealerships if there are issues with the delivery, and for other markets, there is direct communication between the dealership and the carrier. For example, in market M9, the carrier contacts the dealership the day before arrival, confirming that everything is going according to plan. The MC in market M9 further mentions that the system functions very well and implicitly states that the practice of the carrier calling the dealership one day ahead *"is very reliable."*

Proposals from the MCs

Five of the MCs, in markets M1, M3, M6, M7, and M8, state that more information regarding quality issues in the EIS would be highly beneficial and speed up dealership processes and planning. According to the MC in market M1, this would further improve as it would allow the dealerships to order spare parts before the car arrives at their yard.

5.2.2 Dealership Operations - MC

This section accounts for the results found within the area of Dealership Operations. Dealership Operations refers to the work conducted at dealership locations and how various aspects and events affect the dealership's activities. From the interviews, five areas of concern are identified within the main issue of dealership operations and are accounted for below, namely *Quality*, *Extras/Add-ons*, *Workshop Activities*, *Early/Late Arrivals*, and *Dealership Capacity*.

Quality

Close to all markets' MCs address that if quality issues occur it will result in additional lead time at the dealership stage. Furthermore, it is stated by the MCs that if quality issues are found it might cause uncertainties regarding the state of the cars when they arrive. The uncertainty might result in an unwillingness by dealerships to book handover before an inspection of the vehicle after dealership arrival has been made. This creates an additional reason for dealerships, on top of an sometimes unreliable ETA, to avoid booking handover before the car has arrived at the dealership. One MC also mentions that repair times, if more uncommon quality issues were to occur, can be quite long as spare parts have to be ordered from offshore sites and are not kept in warehouse stocks close to the market. As a consequence of quality issues sometimes occurring, the MC in market M8 argues that the case company cannot put too much pressure on the dealerships to have short lead times as it do not always provide the necessary conditions to do so. Due to market M9's use of a central hub, quality issues are found and resolved centrally before being sent to dealerships according to the MC, unlike other markets where quality issues are found and resolved at the dealerships.

Proposals from the MCs

The MC in market M6 argues that lead time would be decreased and reliability increased if there was a way to minimise the quality issues, that sometimes occur, with the cars. The MC in market M2 states that a quality inspection of the car before dealership arrival would be helpful, suggesting, as an example, that a quick video recording of the cars in EH that the dealerships could look at in the EIS would assist.

Extras/Add-ons

It varies between markets whether the MCs believe that the supply of extras causes delays or if it does not impact the lead times. Several MCs mentioned supply issues of some extras. However, they also mentioned that this was a temporary problem. The MC in market M1 argues that the supply of extras is the main driver of lead time at the dealership stage as they have to wait for these to be delivered and installed before handover. Meanwhile, the MCs in markets M2, M4, M5, and M6 mention that extras cause little or no delays. Both the MCs in markets M3 and M5 state that extras are planned and ordered before the car has arrived at the dealership to smooth the operation; however, the MC in market M3 addresses supply issues of some extras as a major lead time driver. According to the MC in market M7, this is true for them as well, arguing that the supply of extras is an issue. However, in market M7, supply issues of extras has less of an impact on the lead time. This is due to the dealerships addressing this issue by conducting the handover without the extras and installing it at a later stage by having the customer drive to the workshop and wait as the installation is a relatively quick process. Another MC, in market M8, also expresses concerns regarding the supply of extras but that the dealerships wait with the handover until the installation has been made. The same MC explicitly mentions that having the customer come by the workshop for later installation is not an option as there are long driving distances to the closest dealership for some customers. According to the MC in market M9, their chosen method is to keep an inventory of extras to deal with supply uncertainties.

Booking of Workshop Activities

At what stage in the supply chain dealerships book the workshop activities differ between markets. In most markets, the dealerships book the workshop activities after the car has arrived at the dealership due to the uncertainties and distrust in the ETA. Additionally, the MC in market M4 explicitly expresses that the late booking of the workshop activities is a major driver of lead time. However, both the MCs in markets M1 and M8 mention specifically that dealerships in their markets book the workshop activities before the car has arrived at the dealership and thus rely on the ETA. For two other markets, M3 and M6, the MCs mention that the dealerships have flexibility in the workshop for when to conduct the the workshop activities regarding the required time slots and can therefore perform the activities if a car is late and if the handover time is in close vicinity. However, the MC in market M3 notes that activities are dependent on reliable arrival dates and market M6's MC that they ideally need a couple of days to schedule and perform the workshop activities. In market M9, the inspection of the cars is made in a central location for all dealerships and thus reduces the uncertainties at dealership arrival. For one particular dealership in market M9, all the workshop activities are performed in the central location, further reducing the necessary operations for the specific dealership.

Early/Late Arrivals

In most markets, the MCs state that dealerships have the capacity to store cars at their compound, and thus, cars arriving earlier than announced by the ETA do not pose any problems for the dealerships. The major exception for this is in one dealership where the volume and throughput are relatively high and therefore have parking space capacity issues if a large number of cars arrive earlier than anticipated. While early arrivals are a minor issue for dealerships, late arrivals can be more problematic, according to most MCs. Because some dealerships book the workshop activities before the car has arrived, based on the ETA, late arrivals force them to reschedule the workshop activities and therefore create workshop scheduling issues. The major exception regarding early and late arrivals considering booking the workshop activities is market M9, as the inspection is done in a central location, and carriers call the dealerships one day before delivery. Thus, the dealerships can wait to book the workshop activities until the carrier confirms the delivery date.

Dealership Capacity

The capacity at dealerships varies across markets; however, most MCs state that their dealerships do not have any capacity issues. For market M6, this is mainly because of the volume being spread across a high number of dealerships. Further, market M8's MC mentions that while the dealerships do not have capacity issues, the delivery of cars in batches prevents smooth operation and creates long lead times for cars that have to wait to be processed due to the dealerships handling a certain number of cars each week. In markets where dealership capacity can become a constraint, the MCs regulate the volume of cars by using the dealer hold. Moreover, both the MCs in markets M5 and M7 mention capacity issues regarding handover slots due to the high volume of other car brands at certain dealerships.

5.2.3 Handover - MC

The handover section regards aspects surrounding the process of booking and conducting handovers. It includes actions and decisions that either delay or quicken the handover operation to the end customer. Three areas of results are found, and these are *HO Booking Proposal*, *Rescheduling*, and *Customer Adaptation & Behaviour*, which are presented below.

HO Booking Proposal

For a majority of the markets, the MCs state that the standard is for the date of the customer handover to be proposed after the car has arrived at the dealership site. In many of these markets, there have been periods where the handover was booked prior to arrival, resulting in the cars not being ready at the promised date and thus for the handover to be rescheduled. In most cases, according to the MCs, the dealerships themselves have expressed the need for the handover to be booked after arrival at the dealership site due to uncertainties in quality and lead times. However, the handover is booked prior to arrival in some markets and at some specific dealerships. This occurs in, for example, market M9, where a customer handover date is proposed one day before the car arrives at the dealership site, made possible because of quality issues being avoided at the dealerships due to the inspection occurring in a centralised location. In addition, the carrier circumvents uncertainties in lead times by calling one day before arrival. Market M5 is also booking handover before arrival to the dealership site but through another method. In market M5, the handover date is booked when the car is at the MS, but always two weeks ahead to ensure enough time to solve any problems. Even if everything is ready for the handover long before the decided date, the MC in market M5 states that the handover is not rescheduled. In both markets M6 and M7, the handover date is proposed prior to arrival only at specific dealerships. In both of the markets, respectively, this occurs at the dealerships that are owned by the case company. For markets where the handover date is proposed after arrival at the dealership, it is not implicitly stated how long it takes between arrival and booking.

Proposals from the MCs

The MC in market M6 suggests that customers should be able to inform at an earlier stage in the order/purchasing process when they want the handover of the car to occur. This would alleviate the risk of sending cars to dealerships' yards that are left standing for weeks because the customer wants its car later than the earliest arrival.

Rescheduling

All MCs express that rescheduling the handover date is to be avoided. Some mention that this is due to it having negative effects on customer satisfaction. Market M1's MC states that they are *"trying to not reschedule handovers, that is why we are waiting with booking handover until the first check at the dealership stage."* In market M8, the MC mentions that customers appear suspicious about hidden damages or issues when first inspecting their car if there has been a rescheduling of the handover date. In market M9, the MC states that rescheduling the handover date almost only occurs if the customer wishes it. Important to remember that rescheduling of the handover date can also occur due to customer wishes.

In market M6, however, there is another working process regarding rescheduling the handover date. The MC in market M6 states that when there is a high volume of cars that are to be delivered each day, nothing can go wrong, and if it does occur, *"then you need to reschedule HO, and the customer gets unhappy [...] we try to avoid this at all costs."* The MC further argues that if a car is not delivered on time, they often wait until the last second as the dealerships often have the flexibility to prepare the car for the customer handover, even if it arrives two days before the handover date. Thus, when the car does not arrive in time, the customer handover date needs to be rescheduled. In such a case, according to the MC, the date is postponed just a few days, thus sometimes prompting a second rescheduling of the handover date if the car does not arrive. Furthermore, the MC in market M6 mentions that the customer has full transparency to what is happening and that it often becomes *"great in the end."*

Customer Adaptation & Behaviour

The MCs across many of the analysed markets state that customer wishes are crucial to consider in the handover process. The adaptation to customer wishes and the goal of customer satisfaction is often connected to avoiding rescheduling, as can be read above. As an example, the MC in market M4 state that *"to have a high customer* *satisfaction we cannot do any promises we cannot hold."* Some MCs argue that the customer adaptation is causing longer lead times at the dealership stage. In market M2, the MC states that the handovers are sometimes delayed due to customers not being ready, for example, not having a charger for an electric vehicle installed at home. The same MC further states that *"we always take the customers' wishes into consideration. If they want the car to be delivered in one month, we will have to do that."* In market M6, the MC states that customer requests are always taken into consideration, referring to when the customer wants to pick up the car. However, the MC also adds that there is no system early on for the customers to announce how long in the future they want the handover to occur, thus resulting in some cars being left standing at the dealership stage for quite some time. The MC in market M9 agrees and further argues that *"you can not override customer wishes, if they want to have the cars in three weeks, we will have to live with it [...] we can not push the customer."* However, the MC in market M9 mentions that they are working on a statement, similar to other car brands, where the customer agrees to pick up the car within a certain time, and currently, they are sometimes offering the customer a "goodie" if the car is picked up early. Lastly, market M9's MC explicitly states that customer availability is a factor for lead time at the dealership stage in the supply chain.

Regarding leasing companies and Fleet cars , in some markets, it was expressed by the MCs that the typical arrangement is for the leasing cars to be picked up at the end of the month. Thus, this results in a rather lengthy lead time for such vehicles if delivered early in the month.

5.2.4 Internal Operations - MC

Internal Operations regard procedures and practices internally within the case company and its dealerships. Mainly, this section serves to provide an understanding for ways of working at the company, why operations function as they do, and consistencies across markets. Below is a presentation of the three areas found within Internal Operations; *Structured Communication with Dealerships*, *Differences Between Dealerships*, and *Directives & Policies.*

Structured Communication with Dealerships

In most of the markets, the MCs have weekly meetings with dealerships where they present forecasts and discuss, at a round table, thoughts and reflections they might have. Of the analysed markets, the MCs in markets M3, M5, M6, and M8 do not have scheduled weekly meetings with their dealerships. In markets M3 and M5, the MCs instead have monthly meetings with dealerships. Furthermore, the MC in market M5 states that they do not have any standardised meetings. Another MC, in market M3, states that they only have monthly meetings with dealerships. However, if deviations or issues occur at a certain dealership, more frequent weekly meetings are held with that particular dealership until the problem is solved.

Differences Between Dealerships

Interpretations regarding differences between dealerships at the markets differ somewhat. Three MCs, in markets M1, M5, and M9, all find that their markets' dealerships work with similar characteristics, without any significant differences in their working methods. Meanwhile, in markets M3, M7, and M8, the MCs all argue that high volume dealerships tend to be more effective and structured. In part, according to the MC in market M3, this is due to high volume dealerships having more flexibility as they have more cars they can cycle between in workshops if delays or similar occur. On the contrary, market M7's MC argues that high volume dealerships are more structured, while low volume dealerships have a higher degree of flexibility and can react and adapt better to short term changes or customer requests. Only one MC, in market M6, mentions that some dealerships prioritise handover and processing of other car brands above the studied company while simultaneously noting that other dealerships find the case company exciting to work with and therefore prioritise them before other brands. Market M2's MC explains that some differences between dealerships are due to them having different priorities. Some dealerships prioritise customer requests, while others prioritise having a short lead time. The differences in priorities create different ways of working. Finally, according to the MCs, no significant differences in effectiveness can be seen between internally operated handover centres and external dealerships also handling the company's handovers.

Directives & Policies

Regarding directives, the two that were discussed in the interviews are *when to book handover date* and *maximum lead time at the dealership stage*. From the interviews, it is apparent that in most markets, either the MCs have not received any handover directives from the case company's HQ, the MCs have decided to deviate from the directives to better adapt to its market situation, or directives differ between markets. For example, market M1's MC states that the directive from the studied company is to book handover when the car is at EH, but due to uncertainties, the dealerships at the particular market book handover after the initial inspection of the car. In market M9, the directives are to conduct the handover as soon as possible; however, the MC states that customer wishes are more important and therefore leaves it up to the customer to decide the handover date.

According to the differences in answers from the MCs, the dealership lead time directives vary significantly between markets. Regarding when to book handover, the MCs state that they have not received any directives or that the handover should be booked before dealership arrival. Thus, the directives from the company are overall unclear or non-existent, according to the MCs.

5.3 Results from the Dealership Survey

In this section, results from the dealership survey are presented. The survey was divided into five parts, formed by the areas discovered in the qualitative phase, with the addition of questions regarding suggestions and ideas from the dealerships. For the entire survey, see Appendix B.2. This section is divided into four parts with similar headings as the previous section with results from the MC interviews. While the survey's headings were different, they are closely related to the headings used in this section.

The section starts with questions regarding the supply chain, including lead times and information. It is followed by results regarding dealership operations and extras, thus, operations when the car has arrived at the dealership. The third subsection concerns processes regarding the booking of customer handovers and how the dealerships perceive directives regarding the handover. The last section concerns regular communication between the dealership and the case company. When stating results in the form of ratings in the survey, a higher number is better, if not stated otherwise.

5.3.1 Supply Chain - Dealership

In the supply chain section of the survey, questions were asked regarding aspects and areas relevant to the dealership before the car arrives at the dealership compound. Areas covered in this section include carriers, the ETA, quality, and information flow. The results for each individual market, as well as the average, can be seen in Table 5.1.

	M1	M2	M3	M4	M5	M6	M7	M8	M9	Avg.
Carrier Overall Satisfaction (Q3)	3.0	3.4	3.0	3.3	5.0	3.9	3.7	4.0	4.0	3.7
Reliability ETA in EIS (Q4)	1.0	2.9	2.0	3.0	4.0	3.4	3.3	3.7	3.0	3.1
Perceived Quality of Information (Q6)	5.0	3.0	2.3	3.0	4.0	3.1	3.3	2.7	4.0	3.2

Table 5.1: Results from the dealership survey in Appendix B.2 regarding supply chain in response to Questions 3, 4, and 6.

Carrier Overall Satisfaction

At an overall level, the dealerships are satisfied with the carriers, rating it at 3.7 out of 5.0, and there are no significant discrepancies between markets. When asking the dealerships to comment on their perception of the carriers, they seem rather satisfied with a few exceptions complaining about lacking information and, for example, *"no respect for delivery hours."*

Reliability of the ETA in the EIS

When asked to rate the reliability of the ETA, the dealerships rate it at 3.1 out of 5.0. While the dealerships across markets mostly agree with this rating, two markets rate ETA reliability at around 4.0 out of 5.0, while one market rates it at 2 out of 5.0. Further, when asked if the ETA is used in operations and planning, 38% dealerships claim not to use it while 62% are using it, as visualised in Figure 5.2.

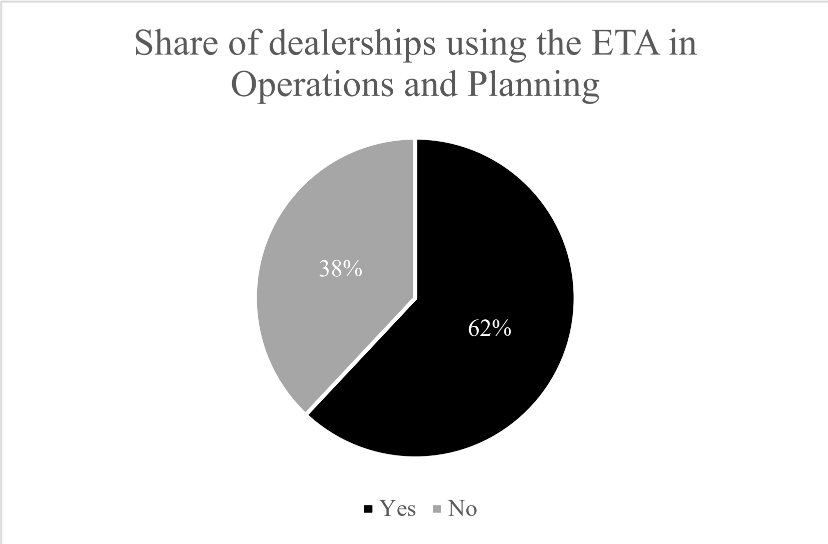

Figure 5.2: Share of dealerships using the ETA in operations and planning in response to Question 5. See Appendix B.2

Perceived Quality of Information

The dealerships rate the quality of information regarding lead time delays and issues at 3.2 out of 5.0. Three of the markets rank it at 4.0 or over, while the remaining six rank it around or below the average. A majority of the dealerships' comments on lead time information and the ETA regard the latter as often being unreliable and that there is a lack of information regarding why the car is late. A few dealerships complain about a lack of updates on delays in the EIS. One dealership states that they utilise delivery lists from the carriers in their planning because of unreliability in the ETA. Two dealerships comment that the reliability in information is good but that it has gotten worse over time. However, positive comments include dealerships pointing out that the ETA is reliable in most cases and that they cooperate with the company under investigation to solve issues.

5.3.2 Dealership Operations - Dealership

This subsection includes the dealership operations part of the survey, and regards questions relevant after the car has arrived at the dealership. The questions cover aspects regarding the quality of the car, process adaptations. Additionally, it also covers workshop, and handover slot capacity. Finally, to understand how much time each task takes at the dealerships, the section includes a graph with dealership operation tasks in which the dealerships estimated the amount of time each activity took compared their other activities, see Figure 5.3. The results for each individual market, as well as the average, can be seen in Table 5.2.

	M1	M2	M3	M4	M5	M6	M7	M8	M9	Avg.
Changes in Operations due to Quality Issues (Q8)	3.0	3.9	3.7	3.7	3.5	2.2	2.2	3.0	3.5	2.9
Capacity in Workshop Slots Affecting Dealership Lead time (Q10)	1.0	4.4	3.0	2.3	3.0	2.8	2.2	2.0	2.5	2.9
Capacity in Handover Slots Affecting Dealership Lead Time (Q11)	3.0	3.5	2.7	2.3	3.5	2.8	2.5	2.3	3.0	2.8

Table 5.2: Results from the dealership survey in Appendix B.2 regarding dealership operations in response to Questions 8, 10, and 11.

Changes in Operations due to Quality Issues

Regarding the extent to which dealerships have had to change their processes due to quality issues of delivered cars, the overall score was 2.9 out of 5.0, the higher the worse. This result indicates an impartial response to the question. When asked about what changes they have made, multiple dealerships mention changes to preparation time before handover due to extended need for final preparations, causing a later delivery to the customer. Further, some dealerships specify that they have changed handover booking procedures due to quality issues, waiting for the car to arrive and giving it an inspection before booking handover to ensure its condition and expected lead time.

Capacity in Workshop, & Handover Slots Affecting Dealership Lead Time

When questioned about how capacity in workshop activities affects the dealership lead time, the dealerships scored 2.9 out of 5.0, the higher the worse, indicating a somewhat impartial response. There were a few discrepancies from the average value, one notable exception with market M2 averaging 4.4 out of 5.0. Regarding capacity in handover slots, the average score was 2.8 out of 5.0, the higher the worse, with no significant variations, also in this instance indicating an impartial response. Several dealerships state that they have sufficient workshop and handover capacity; however, that capacity can become an issue if cars are delivered in batches.

Dealership Stage Lead Time Drivers

Of the tasks listed, there are a few aspects that stand out as taking more time than others, as can be seen in Figure 5.3. Almost 35% of the dealerships state that lead time uncertainty (for the arrival of the cars) contributes to "Much" or "Very Much" lead time at the dealership stage; meanwhile, approximately 18% state that it does not contribute to any lead time. The remaining 47% of dealerships state that lead time has uncertainty only has somewhat of an effect on lead time. Regarding quality issues, close to an equal amount of dealerships have stated that it takes "Much" or "Very much" lead time as that has answered that it does not contribute to lead time, 27% and 24% respectively. Similarly, this is also the case with customer requests, with an almost equal for "Much" or "Very much" and not at all, 30% and 27% respectively.

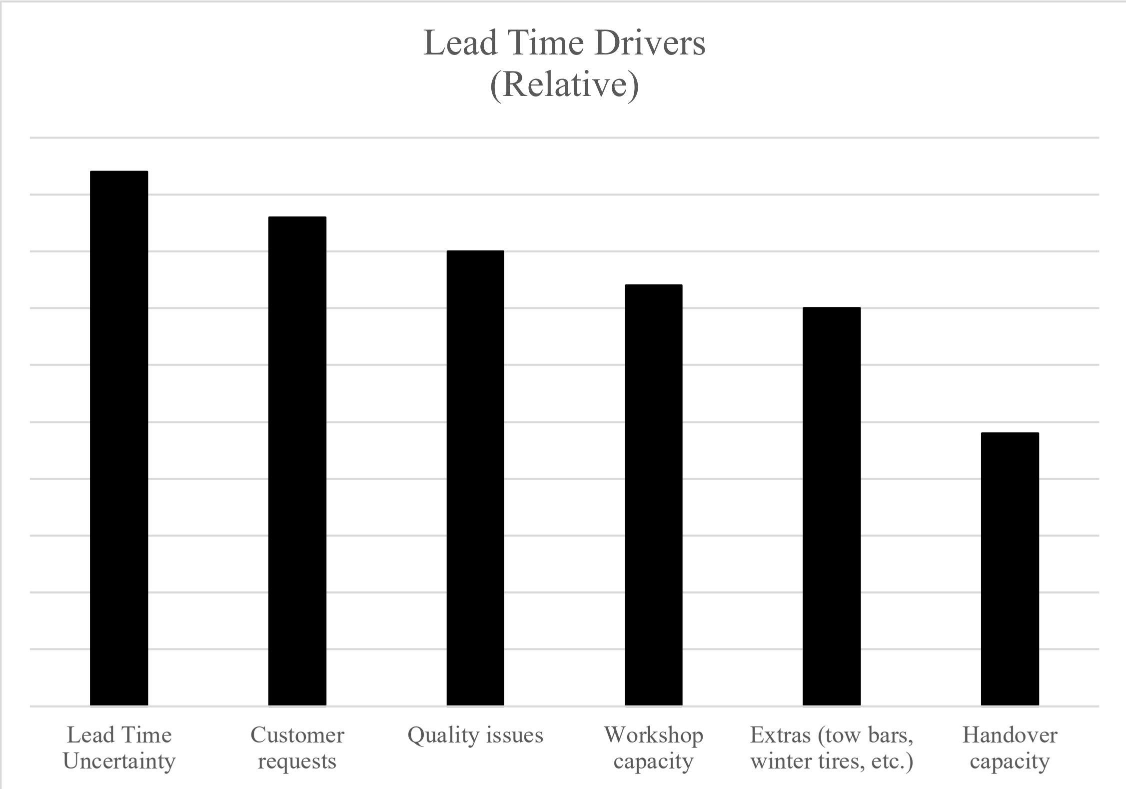

Figure 5.3: Results on relative lead times drivers from the dealership survey, showing the activities driving the most/least lead time at the dealership stage. In response to Question 20. See Appendix B.2.

Two tasks clearly do not contribute as much to lead time at the majority of the dealerships, that is, "Extras" and "Handover Capacity", see Figure 5.3. For extras, 27% of the dealerships say it contributes to "Much" or "Very much" lead time, while almost 46% state that it does not contribute at all to the lead time. The difference is even more significant for handover capacity, with almost 22% stating that it contributes to "Much" or "Very much" lead time, while more than 62% mean that it does not contribute at all to the lead time. Finally, while not being as clear of a difference as the two tasks mentioned above, "Workshop Capacity" contributes to "Much" or "Very much" in lead times for almost 30% of the dealerships, while close to 38% of the dealerships state that it does not drive any lead time.

In the survey, the table had one category with "Others", where the dealerships could specify any other aspects/tasks that are important to consider. An equal amount of dealerships stated that it takes no and "Much" or "Very much" lead time, just above 18% for both. The rest states that they do not know, or that it contributes to some lead time. The comments that stand out in the "Other" category are mainly about leasing companies having requests or routines that contribute to time before the handover can be conducted.

The results above show that uncertainties in lead times are the aspect that contributes to the most significant amount of lead time at the dealerships. On the contrary, it seems that handover capacity and extras do not act as lead time drivers at most dealerships. Handover capacity is the factor that contributes the least to the lead times.

Suggestions from Dealerships on how to Quicken Dealership Operations

While many dealerships comment that they have good control over their dealership operations and are satisfied with the situation, others state a few key suggestions for reducing dealership lead time. The most common suggestion, or request, is to have a more accurate ETA. Another suggestion is to have more information provided to the dealership during the car's transportation so that the dealership knows where the car is and thus, has a better sense of whether the ETA is accurate or not. Moreover, one dealership notes that the car sometimes has the wrong status in the EIS and that knowing where the car is physically would help reduce that uncertainty. Further, one dealership suggests having more information regarding the delivery date of extras as it would ease and quicken their workshop planning.

5.3.3 Handover - Dealership

This subsection contains results from questions regarding the handover and procedures for handover booking. First, the questions regard the timing of handover booking, the triggering factor to send out the handover date proposal, and the dealerships' priorities when proposing handover dates. The following areas include dealerships' perception of directives from the case company for when to book handover and the number of lead time days. Finally, the last question regards factors that would motivate the dealership to perform the handover quicker than what they are doing today.

Proposal of Handover Date

The dealerships were asked to state when they send out a proposal for the handover date to the customers in relation to dealership arrival. Out of all the dealerships roughly 82%, state that they book handover on the day of dealership arrival or later. Thus, 18% of the dealerships propose a handover date before dealership arrival. Further, 44% of the dealerships book handover the day after dealership arrival or later. The distribution of answers is visualised in Figure 5.4.

The triggering factor for booking the handover differs between dealerships. Roughly two thirds of the dealerships' triggering factor is to book handover after dealership arrival, and some also require inspection or workshop activities to be performed before booking handover. Some dealerships also mention inspection of extras' installments and licence plate arrival as additional triggering factors. Furthermore, a number of the dealerships mention that they have tried booking earlier than arrival and inspection, but that it resulted in rescheduling because of either late arrivals or unforeseen damages to the cars. The remaining dealerships that send out handover proposals before dealership arrival mention that a triggering factor is the car being at the MS or being sure when it arrives. Being certain when the car arrives can be a *"notification from carrier."* One dealership explains their triggering factor to be *"will be sure the car comes, [...] good customer experience."*

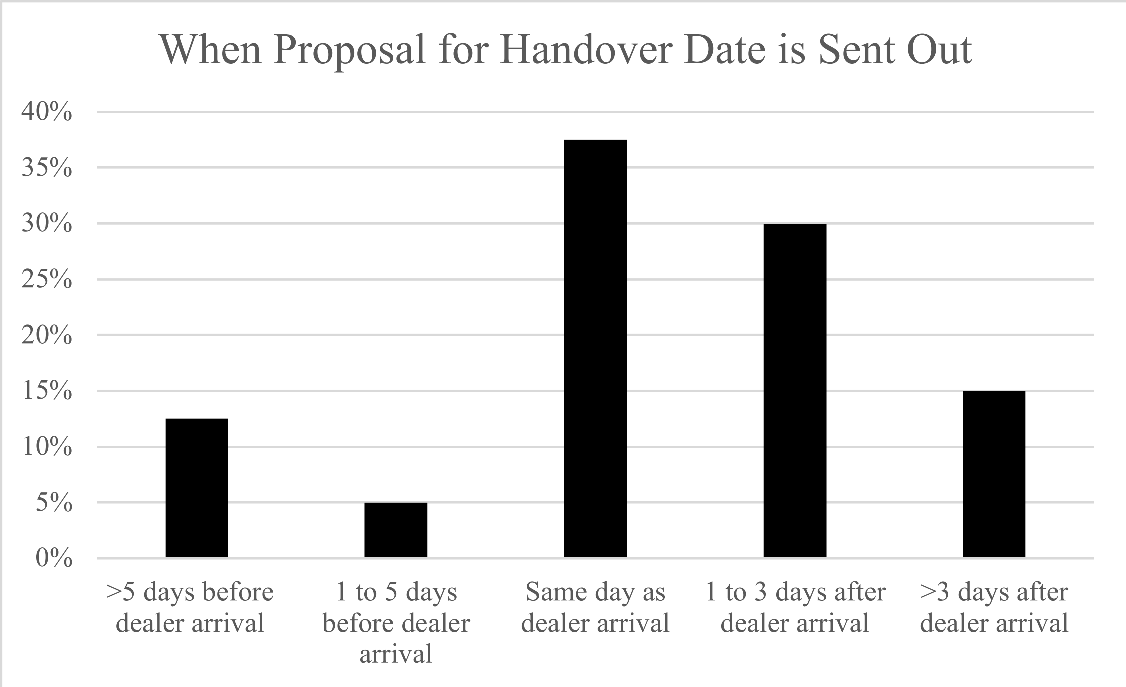

Figure 5.4: Results from the dealership survey regarding at which point proposal for the handover date is sent out, in response to Question 13. See Appendix B.2

There is a discrepancy in priority between dealerships when proposing a handover date, as can be seen in Figure 5.5. The main priority for 41% of the dealerships is "Short time between car arrival and customer handover." At the same time, 49% state that their priority is mainly "Car being ready for handover (to avoid rescheduling)". Further, 8% of the dealerships prioritise customer preferences, with one dealership specifically stating that *"we call the customer and ask for his favorit [*sic*] time/date."*

Directives Regarding Handover

Out of the all the dealerships, 77% state that they perceive the directions as clear from the case company when to book handover. Further, one of the dealerships mentions that they believe the directives are clear from their market's order manager. Only a small amount of dealerships have answered that the directives are unclear and some that they do not know. One of the dealerships mentions that the information in EIS; *"could be more specifik [*sic*]."*

When asked how they perceive the directives from the case company regarding the maximum number of lead time days, 62% of the dealerships state that they are clear, 10% unclear and 8% that they do not know. Out of the remaining dealerships, the answers differ. For example, one mentions that the directives are to book handover as soon as possible and another that they do not take the directives into consideration but push the handover as soon as possible regardless. Furthermore, a few of the dealerships mention that, while the directives are clear, they are either impossible or sometimes impossible to perform in practice.

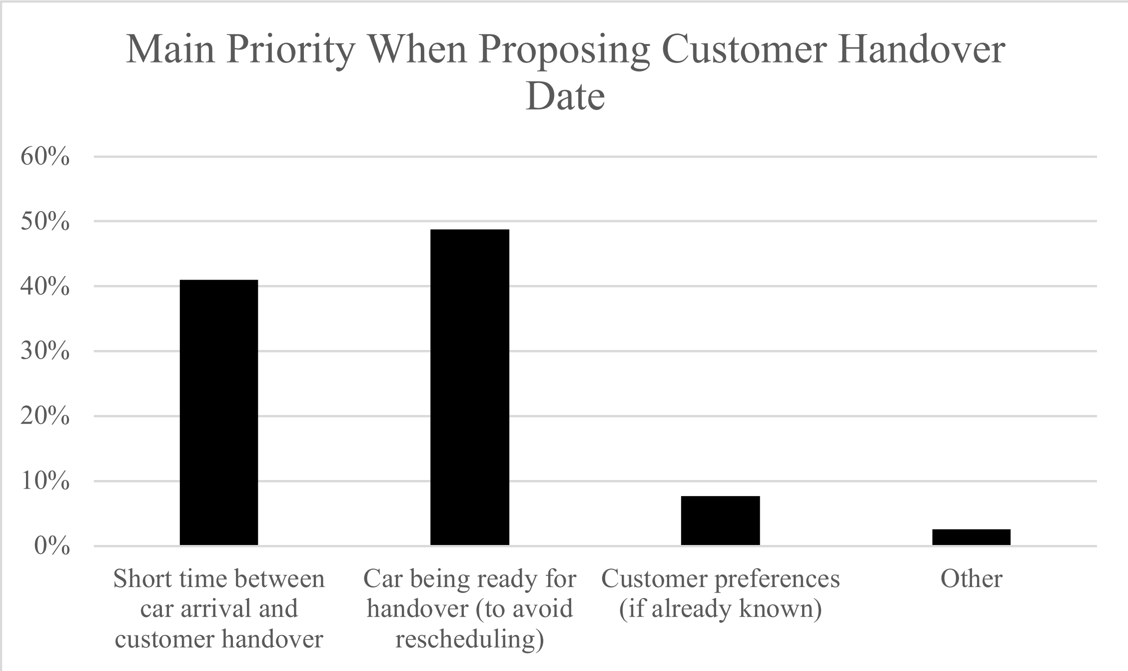

Figure 5.5: Results from the dealership survey regarding regarding priorities when proposing customer handover date, in response to Question 15. See Appendix B.2.

Motivational Factors

When asked about factors that would motivate dealerships to conduct handover quicker than today, most dealerships answer that they are motivated as it is and that they already focus on getting the cars to the customer as quickly as possible. Some dealerships also mention a better ETA and information in the EIS as motivational factors.

5.3.4 Internal Operations - Dealership

Within internal operations, the first question regards dealerships' perception of their regular contact with the case company. The second question concerns aspects that the dealerships appreciate working with the company. Having this knowledge can support the studied company in its work to find best practices working with dealerships across markets. The results for each individual market, as well as the average, can be seen in Table 5.3.

Satisfaction with Regular Contact with the Case Company

The dealerships rank the regular communication with the case company highly, with an average score of 4.0 out of 5.0. There are only a few markets below 3.8, with the lowest at 3.5. When asked how often they have regular contact with the company, they indicate that it differs between markets. While 25% of the dealerships who answered the questions state having monthly meetings, most of these are dealerships in market M6. In two markets, most dealerships state having weekly or sometimes daily meetings with the case company. However, in another market, all of the dealerships have daily contact with with the case company.

	M1	M2	M3	M4	M5	M6	M7	M8	M9	Avg.
Satisfaction with Regular Contact with Case Company (Q18)	5.0	3.5	3.7	4.3	5.0	3.9	3.8	5.0	4.0	4.0

Table 5.3: Results from the dealership survey in Appendix B.2 regarding internal operations in response to Question 18.

Appreciation from Dealerships Regarding the Regular Contact

When asked about what the dealerships appreciate the most about working with the case company, the contact, follow up, and support from the company's market teams stand out as the most appreciated features. Moreover, dealerships praise the close contact the studied company has with them, its strive to always give them correct information, and its responsiveness to changes and improvements. Lastly, one dealership specifically expresses appreciation for the case company being as customer oriented as it is.

6
Discussion

In this chapter, the results are discussed with regard to the research questions. The discussion is supported by literature used in the analytical framework, and the chapter is structured in the same order as the result chapter. In each subsection, identified issues from the results are reflected upon, analysed, connected with other findings, and summarised.

6.1 Supply Chain Issues

In the following section, a discussion is held regarding the supply chain. First, the ETA and related uncertainties are discussed, connecting it to how the ETA is being used and perceived by the MCs and the dealerships. Second, uncertainties regarding the ETA are linked to the literature presented in the analytical framework, and a discussion is held regarding reducing uncertainties.

6.1.1 The ETA and its Uncertainties

The MCs emphasise that the issue of using the ETA is that it is neither reliable nor updated frequently enough. Putting themselves in the dealerships' perspective, the MCs mean that the intended use of the ETA is to allow for dealerships to plan their activities accordingly. For example, if a car is set to be delivered on a specific date, the ideal process is for the workshop activities to occur shortly after arrival. Furthermore, both the MCs' and the case company's prevailing thoughts seem to be that the customer handover should be booked relatively early in the logistical chain and for all activities to be set up before the car arrives at the dealership's yard. Thus, it can be argued that, for the dealerships' operations to run smoothly and efficiently, there is a need for reliability and updated information earlier in the chain. The lacking updates and reliability of the ETA seem to be a consequence of how it functions. As updates of the ETA only occur at specific points in the logistical chain, for example, when the car enters EH or departures from the MS, there are potential gaps where the last updated information becomes outdated. The current structure of the ETA is visualised in Figure 6.1. By having this structure, the ETA's reliability depends on the carrier currently transporting the car. This system results in that any error or unforeseeable events in the carrier's operations will cause the ETA to be inaccurate, in turn affecting the dealership's planning and operations. This insight leads the discussion to the transportation of the vehicles between EH and MS and from MS to the dealerships' yards.

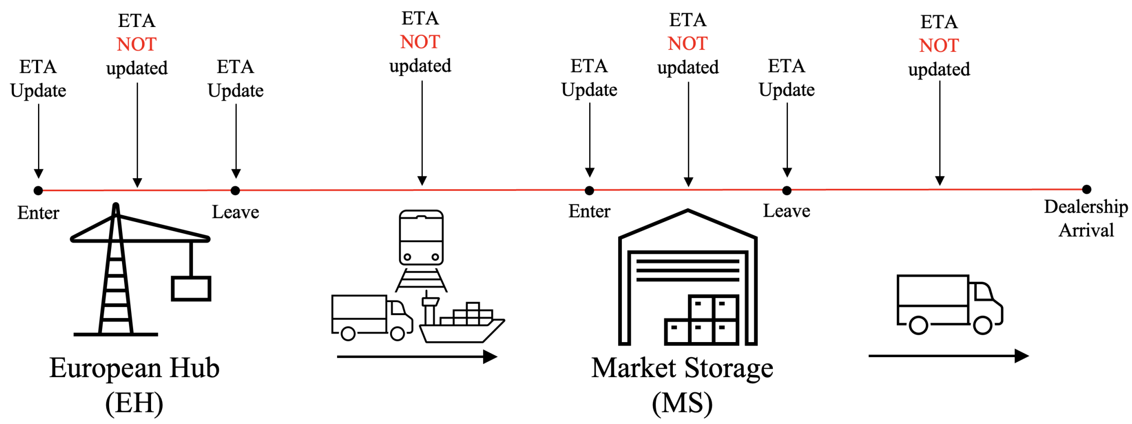

Figure 6.1: How the ETA is being updated currently and thus the uncertainty between updates, as visualised by the red line.

The MCs' overall impression is that lead times from EH to MS are unreliable; however, that lead times from MS to the dealerships are, on the contrary, rather reliable. The results from the exploratory phase further support this, where it can be seen that the ETA from MS to the dealerships are relatively reliable, however with some periods of deviations and inaccuracy, spanning across all analysed markets. These results combined show that the ETA in EH is unreliable, but on the other hand that the ETA is rather reliable from the MS. However, almost all MCs argue that the ETA could be more reliable to be used in the dealerships' planning. If the conclusions here are valid, there are three possible hypotheses.

As a first hypothesis, this implies that it is not sufficient for the ETA to be reliable from the MS stage of the logistical chain, but that it needs to be reliable from as early as in EH to reach its full potential of usefulness to the dealerships. A possible reason for this could thus be, for example, that the dealership activities need to be planned further ahead than the lead time from MS to the dealerships.

The second hypothesis regards how the MCs and the dealerships trust and perceive the ETA data. Suppose there have been periods for all markets where the ETA from MS to the dealerships were more inaccurate. In that case, new processes can have formed in response, such as not booking handover until the car has arrived at the dealerships' yards because of lower trust in the provided information. Nevertheless, it is important to bear in mind that results from the dealership survey demonstrate that the dealerships are currently satisfied with the carriers (3.7 out of 5.0), indicating that if this hypothesis is true, the distrust can be with the case company's information sharing regarding delays or interference, and not the carriers'. Assume dealerships and MCs do not trust the ETA, independent of its current accuracy and reliability, then, planning will be done without regard to the ETA, not relying on the information. Instead, the current processes developed during a period of low lead time precision will be used onwards. The second hypothesis can find some support in the result of the dealership survey. On an overall basis, the dealerships perceive the reliability of the ETA to be mediocre (3.1 out of 5.0). Moreover, merely 62% of dealerships state that they use the ETA to plan daily operations.

The third hypothesis regarding dealerships' use of the ETA is that they circumvent the system by using information provided by the carriers, such as loading lists stating what cars are to arrive in a particular week. There are a few mentions of such workarounds in the dealership survey. Moreover, market M9's MC states that, in its market, carriers call the dealerships one day before arrival, allowing them at least some planning. As only a small majority of the dealerships utilise the ETA (62%), it is safe to assume that the rest are using some other system to plan their operations; however, this remains unclear.

6.1.2 Reducing the Uncertainties

The issue of keeping the ETA and the information reliable between the actors in the case company's supply chain, as has surfaced during the interviews with the MCs, is in line with what Gadde (2014) states regarding coordinating multiple actors and carriers in the supply chain. Gadde (2014) further argues that this can result in a lack of control, which also applies in the company's supply chain regarding the ETA and unreliability of lead times on specific routes. This uncertainty in the supply chain can be referred to as both Micro Level and Meso Level, as stated in Flynn et al. (2016), due to it being in the form of both unreliable lead times but also the lack of information sharing between actors involved. Both Min et al. (2005) and Barratt (2004) argue for the importance of collaboration, as well as the ability to share information and data between supply chain actors, for it to be successful, and this seems to be highly relevant in the studied company's situation. With more information sharing between the case company and its supply chain partners, information as well as lead time reliability should increase, thus proving highly beneficial for all actors' operations, including the dealerships. Furthermore, it can be assumed that carriers themselves have extensive and sufficient knowledge of its operations and transport vehicles' whereabouts. This is information that could be shared with the case company to allow the ETA to be updated more frequently, or even continuously, updated, as visualised in Figure 6.2.

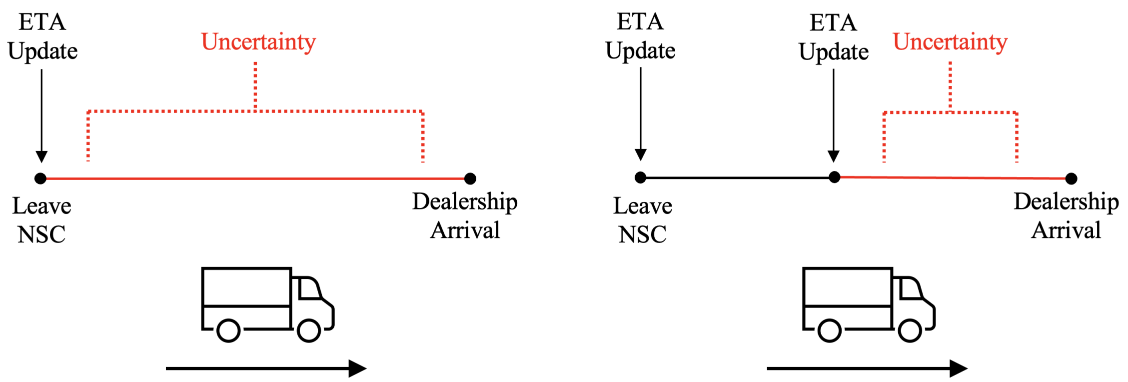

Figure 6.2: The present situation in terms of ETA uncertainty compared to if the ETA was updated more frequently.

Some MCs argue that it would be beneficial for the dealerships even to have the ETA state at what time the car is supposed to arrive; however, this highly depends on the carriers' internal information and processes. Moreover, this would require an even higher delivery precision than today's. If carriers sometimes have difficulty delivering cars within the current contracted lead times, it would be an increase in requirement and difficulty for them to deliver within an even narrower time window, down to a specific time frame in the day. Nevertheless, to achieve such collaboration between actors that the ETA becomes reliable, at least to the specific day of delivery, a higher degree of supply chain integration could be a potential solution. Implementing a higher supply chain integration is also a method of dealing with uncertainties proposed by Flynn et al. (2016) and Simangunsong et al. (2012).

Previously, a hypothesis was presented that the dealerships' lack of trust in the ETA and the subsequent distrust in both information and reliability from carriers are due to periods of inaccuracy in delivery precision. This is in line with what Kwon and Suh (2004) and Fawcett et al. (2012) emphasise, namely that the performance and reliability of the partners involved are the most prominent factors in building trust in the supply chain relationship. It is not unreasonable to assume that it is easier to destroy than to build trust. This implies that periods of high inaccuracy in a supply chain partner's operations create distrust in the partners' capabilities, even if the accuracy is increased to satisfactory levels.

6.2 Dealership Operations

The following section contains discussions regarding operations at the dealerships. Moreover, the discussion involves aspects that affects the dealerships' operations. First is a discussion on how quality affects dealer operations, whether quality issues are that common and possible solutions to undertake. The next discussion point regards how both supply of extras affect lead time and potential solutions. The final subsection includes a discussion concerning the timing of booking workshop activities.

6.2.1 The Issue of Quality

A vast majority of the MCs mention quality issues as a lead time driver at the dealerships. It is argued that; as dealerships are unsure of the state of the car, the uncertainty will cause an unwillingness to book the customer handover prior to an inspection of the vehicle. The result of the dealership survey further supports this. It is revealed that a number of dealerships have adapted and changed their processes (scoring 2.9 out of 5.0) to deal with quality issues. From these results, a reflection that comes to mind is whether this is an issue affecting all car companies or if the number of issues for the company under investigation is greater than the rest of the industry. However, the answer remains unclear.

The MCs argue that many dealerships wait with booking handover until they have conducted a first inspection to assess whether the car has quality issues. This statement is backed up by the dealership survey, where 82% of dealerships state that they book handover after arrival and that this is primarily because they want to conduct an inspection before booking. Furthermore, one must ask if the quality issues really are that great and frequent to force such behaviour. Nevertheless, there are three possible explanations.

The first explanation is that the proportion of cars arriving with damages is indeed high enough, causing many dealerships to await customer handover booking until a first inspection has been made.

The second explanation is that, yet again, there is an issue of trust and perception. If there have been periods with a high amount of damages or that the number of damages is greater than that of the industry standard, the dealership will choose the most secure process. In this case, the most secure process is to wait for the car to arrive at the dealership's yard before planning and booking other activities.

The third and final explanation is that the case company's rather unique and novel business model causes this behaviour. This is described in Section 3.2, where the dealerships' role in the supply chain is to perform final preparations and perform the customer handover. As the car is supposed to be delivered as soon as possible, dealerships need to perform the necessary activities quickly. This can result in a stressful work environment compared to the more traditional dealership business model.

When discussing quality, it is important to keep in mind that some cars will always arrive with quality issues, no matter the precautions taken. The issue is instead the proportion of cars with quality issues that force process changes for all cars. There is thus a trade off to discuss here. For example, suppose that 15% of the cars have some sort of quality issue and that all dealership activities, including handovers, are booked within a short time frame of dealership arrival, a period in which there is not enough time to repair eventual damages. This would result in 15% of the handovers being rescheduled, prolonging their associated lead time and causing customer dissatisfaction and dealership planning issues. However, for 85% of the cars, the customer handover would be performed shorty after dealership arrival, resulting in a shorter lead time. On the contrary, if, still, 15% of all cars arrive with quality issues, but with dealerships waiting to book customer handover until a first inspection has been conducted, it would result in longer lead times for 100% of the cars. However, this situation would also result in little to no rescheduling or acute re-planning of the dealerships' activities. If all variables were known, such as the cost of lead time days or the cost of rescheduling the handover date in terms of customer satisfaction, it would be possible to quantify the most appropriate approach. However, as the needed variables are currently unknown, it is outside the scope and possibility of this thesis to perform such calculations.

As described in section 3.4, market M9 has an alternative supply chain compared to other markets, affecting processes of quality handling. According to the MC, quality inspection and reparation of eventual damages occur in a centralised location prior to dealership arrival. Depending on the actual quality issue, as discussed earlier, such a process design might be a satisfactory solution to reduce dealership stage uncertainties. Suppose dealerships know, pre arrival, that the risk of damages is minimal. In that case, they should be able to plan their activities accordingly, thus reducing lead time at the dealership stage by changing handover booking behaviour and avoiding dealerships repairing damages themselves.

It can be argued that competence and inventory should be available to a greater extent compared to having the repair process occurring at the dealership stage when using a centralised location. This should, in turn, result in the repairs themselves being less expensive and more efficient. One suitable location for this centralised process is each MS. Alternatively, inspection and damage repairs could be conducted when the cars arrive at EH as all cars to EMEA pass through that location. Important to note, however, is that the longer cars have to be transported from the last inspection, the more significant the risk of new transport damages occurring. Still, inspecting and repairing the cars centrally allows for vessel transport damages and manufacturing defects to be, at a rather large extent, relieved from the dealerships' responsibility.

Moving inspection and reparation from the dealerships to a centralised market repair hub would itself require costs, and an extensive analysis would be required to determine whether it is desirable. Moreover, the costs, and subsequently, the profitability for each car of a centralised repair hub at the MSs would be subject to the volume of that particular market. Consequently, a market with higher volume would better utilise economies of scale than a market with lower sales volumes.

From statements by the MCs, the dealership survey and the literature, it has become evident that the more information, the merrier. This is further strengthened by the MCs, who argue that more information in the EIS regarding quality issues would ease dealerships' planning significantly. Where the information regarding eventual quality issues should be provided is, however, up for discussion. One MC suggests that a solution could be a video recording of the vehicle at some stage prior to dealership arrival, as this would be helpful for the dealerships' planning. Such a recording could be done in the EH or the MS, depending on how often damages are caused at specific transit legs. The recording could, for example, be found in the EIS for the dealership to analyse. With such a system, at least a significant portion of the uncertainty at the dealership stage could most likely be removed; however, the recording would merely capture damages that are easily seen visually.

Another proposal is that dealerships can create some headroom to account for the time needed to repair quality issues that occurs frequently, which is in line with Simangunsong et al. (2012) strategies to cope with uncertainty. For example, if the most common damage takes approximately one day, or an extended workshop slot, to repair, the dealership could have this in mind when and if proposing the handover date before the car arrives at the dealership's site. This would allow the handover to be booked earlier, reducing lead times. However, as the headroom created is applicable for all cars, it would result in an increased lead time for every vehicle, even for cars without damage. This is a trade off, increasing the lead time for all cars, but on the other hand, booking handover earlier could possibly deal with some of the uncertainty. However, further investigation and information are needed for this to be considered.

6.2.2 The Issue of Extras/Add ons

The supply of extras/add ons is less of an issue compared to quality. However, since 27% of dealerships state that it accounts for "Much" or "Very much" lead time, it is still a factor to take into consideration. Regarding extras/add ons, there are mainly two points to discuss.

The first point regards the supply of extras. Especially in some markets, problems with the supply of extras result in situations where a car has arrived at the dealership but not the required extras to be installed. If supplies were available, this should not be a problem as the MCs state that the standard process is that extras should be ordered before the car arrives to dealerships. However, as there are seemingly uncertainties and delays in the supply of extras/add ons, one potential solution would be for the dealerships to keep a small but sufficient inventory of extras, a solution already in use by at least one market. Because the extras/add ons are standardised, inventories can be kept relatively small and only be used for scenarios where the ordered extras/add ons are not delivered on time to avoid delays and rescheduling of handovers. However, such a system would require the dealerships to use potentially valuable and scarce storage space and should be analysed in relation to how large an issue supply of extras causes, compared to the possible benefits it would bring. Additionally, filling storage space and keeping an inventory of extras/add ons ties up capital for either the dealerships or the case company. However, because inventories to cover supply issues can be relatively small, the capital tied up should be somewhat limited. Furthermore, worth noting is that the capital tie up created by having a small inventory of extras/add ons is relatively negligible compared to the capital tie up of having complete vehicles delayed due to the lack of inventory.

The second point to discuss is what course of action is most beneficial if there are supply issues with extras/add ons. For example, one MC argues that if the car is ready for handover, but the extras/add ons have not yet been delivered, the handover can be performed anyway. The logic here is that the customer is asked to return the car to the dealership when the extras/add ons have been delivered for a quick installation. On the contrary, another MC states that it is not feasible to perform the handover without the extras/add ons installed as the customer might have a long way to drive to the handover location. Minding both scenarios, a compromise could be to ask the customer. If doing so, they would decide whether they want the handover to take place as soon as possible with the caveat of returning to the dealership again or waiting for the extras/add ons to be installed. Important to consider is, however, how the customer experiences such a question. For example, how it affects customer perception regarding a "premium" experience compared to the increased convenience it provides.

6.2.3 Workshop Activities

According to the MCs, most markets plan and book the workshop activities after dealership arrival. This behaviour can be related to the discussion earlier regarding the unreliability of the ETA and the subsequent uncertainty in lead times. As the dealerships score workshop capacity as a lead time driver at 2.9 out of 5.0, it suggests that capacity issues are not the most significant lead time driver; however, that it has some impact. For example, one dealership explicitly states that the slots are wasted if the workshop activities are booked before arrival and the car does not arrive in time. Another dealership mentions that cars arriving in large batches cause capacity issues. This is especially a problem as handovers are supposed to happen in close time proximity for all cars. Again, this brings up the importance of reliability in the supply chain. As dealership capacity is not infinite, it is important to be able to plan activities which are currently hindered by uncertainty and lacking information. By reducing uncertainties, planning would be easier, and the possible issues in capacity could be handled. Furthermore, as some MCs and dealerships mention that batch deliveries cause capacity problems, it should be further assessed. Batch deliveries are likely to overwhelm the workshop capacity at the dealership stage; however, there is a cost compromise between having an increased amount of deliveries and having the cars standing at the dealership site. Regarding capacity, it is also worth noting that a majority of the MCs argue that there are no issues for dealerships when cars arrive earlier than anticipated. This statement is further supported in the dealership survey, where it is not mentioned as an issue by the dealerships. This implies that the dealerships have good capacity in parking spots for cars awaiting workshop activities and handover.

However, according to Figure 5.3, workshop capacity is almost as big of a lead time driver as that of quality issues. This must be viewed upon in relation to the discussion above regarding when the workshop activities are booked at the dealerships. As the workshop activities are often booked after dealership arrival, there is no surprise that there will be some capacity issues, as the car that just arrived will be last in line. Thus, it can be argued that the high ranking of workshop activities as a lead time driver is a direct consequence of supply chain uncertainty and that an earlier booking of the workshop activities at the dealership would result in minimal capacity issues for the said processes.

Furthermore, it is important to note that the dealerships express that handover slot capacity is, in essence, the same as for workshop capacity (2.8 out of 5.0). Moreover, the same arguments and discussion presented regarding capacity in workshop activities can be used for that of handover slots.

6.3 Handover and the Customer

This section, concerning handover and customer adaptation, starts presenting a trade off between shorter dealership lead times and customer satisfaction. Further, the dealerships' unwillingness to reschedule handovers is discussed with regard to customer satisfaction. Following is a discussion about the impact of customer adaptation, lead time effects of adhering to customer requests, and how to minimise lead times while still taking customer requests into consideration. Finally, a four field table regarding the lead time and customer satisfaction is presented. Moreover, the trade off is discussed for achieving both short lead times and high customer satisfaction.

6.3.1 Handover and Rescheduling

A majority of the MCs argue that the handover proposal date is sent out after the car has arrived at the dealership. This is also supported by the dealership survey, where 82% of the dealerships state that it is sent out after dealership arrival. Furthermore, when asked about triggers for sending handover date proposals, the dealerships express that uncertainty, especially in combination with customer satisfaction, are vastly important factors. Both by statements from the MCs and the dealerships, it is clear that there is a trade off between shorter lead times and customer satisfaction. Further, this is connected to the risk of rescheduling an already promised handover date.

Furthermore, the dealerships have divided opinions regarding dealing with the trade off. Almost an even number of dealerships answer that they prioritise short lead time versus prioritising customer satisfaction (41% versus 49% respectively). However, the fact that many dealerships state prioritising short lead time between car arrival to their site and handover must be seen in comparison with 82% of the dealerships stating that they book customer handover after dealership arrival. This is due to the earlier discussion that the reason for booking handover after dealership arrival is done to avoid rescheduling and as a way to handle uncertainties in lead times and quality. If the main priority truly is to have the shortest lead time, handover dates should be proposed before dealership arrival. This, however, imposes a possible risk of rescheduling. Nevertheless, the trade off should probably not be seen in a binary sense. When dealerships state that their main priority is to reduce lead times, the correct interpretation is more likely that they work as efficiently as possible after the car has arrived at their site.

Regarding the issue of having to reschedule a handover date and its implications for customer satisfaction, it is evident that handover rescheduling is being avoided in all markets. This is further supported by earlier discussion, where a vast majority of dealerships state that the handover date is proposed after dealership arrival and that 49% dealerships answer that it is the main priority for them to avoid rescheduling. Whether or not it is true that rescheduling of the handover date has a significant impact on customer satisfaction is not answered in this thesis. However, because both the MCs and dealerships argue that it does, it is assumed to be correct. That rescheduling of the handover date correlates with customer dissatisfaction can be related to Coye (2004), arguing that satisfaction, or dissatisfaction, is constructed by the difference in fulfilment of the customer's expectations and the perceived delivery of said expectation. Thus, with Coye (2004) in mind, it becomes rather clear why rescheduling can have a significant impact on the customer's satisfaction regarding the delivery of its brand new car.

In terms of rescheduling, another aspect to consider is that of "positive" rescheduling, where the customer is contacted with a proposal that the handover can occur earlier than anticipated. One can assume that this would result in increased customer satisfaction. Moreover, it could act as a solution to create some flexibility for the dealerships. For example, say that a dealership believes that an incoming car could be ready for handover at a specific date; however, due to uncertainties, the dealership does not dare to propose the handover for that date. Instead, the handover is proposed to take place a few days later. However, suppose the car arrives in time without impactful quality issues. In that case, the customer can be contacted, and the handover date changed to an earlier date if the customer so wishes, thus, resulting in a "positive" rescheduling. However, it is important to bear in mind that such a solution would require a high degree of flexibility by the customer. Moreover, dealerships could have to allocate more time for calling customers. However, it could be investigated further, especially since it is a solution proposed in the literature by Ho and Zheng (2004), where the customer is promised a date, at the latest, in which the delivery is to occur.

6.3.2 Customer Adaptation

Both the MCs and the dealerships argue that adapting to and taking customer wishes into consideration is highly important. In the dealership survey, almost 30% of the dealerships answered "Much" or "Very much" regarding customer requests as a lead time driver. A critical aspect of customer adaptation regards when the customer wishes to pick up the car. Some MCs state that customers sometimes want the handover to occur a long time after dealership arrival, sometimes weeks, and note that the car then has to stay at the dealership site during that time. According to one MC, there is no, or limited, opportunity for customers to request when they want to pick up their car before dealerships send out handover proposals. Because of this, the customer requests are noted very late.

One MC explicitly suggests that there should be a system where the customers can express when they want the car, thus allowing the car to wait at the most proper location, both from an economic and an organisational standpoint, such as the MS. Such a system should not be that difficult to implement and might make the planning to adapt to customer wishes a bit easier. Further, storing the car at the MS could also be utilised to reallocate that specific car to another customer who has ordered a car with the exact specifications. Because, if the car which the second customer ordered arrives before the due date of the handover request from the first customer, two customers get their cars in a more optimum fashion. However, when dealerships state that customer requests are a rather large lead time driver, it can be that they are referring to a shorter time span, perhaps that the customer wants the handover to happen a few days or perhaps one to two weeks later.

Another option could be to ask the customer to pick up their car early. However, in several instances, it might not be an option to push the customers to accept an earlier handover date than what they have wished, and having such a system might not be in line with a premium brand. Nevertheless, the earlier the customer receives a proposal for the handover date, the earlier the handover will probably occur as the customer will have more time to prepare. This, in turn, implies the system of proposing a handover date prior to the car arriving at the dealerships' site as a potential solution for customer requests as an impactful driver of lead time.

The dealerships prioritising the customer above directives from the case company HQ is in line with Gadde (2014) that argues for intermediaries having a different attitude in that regard. Furthermore, the aspect of having to adhere to customer requests to such a large extent can be related to the business model of the case company, such as the D2C structure entailing a difference from traditional car manufacturers as well as the associated premium brand. This is in line with Shafer et al. (2005) and Schiavi and Behr (2018) stating the importance for the business model to have unique characteristics and novel traits.

6.3.3 The Trade Off - Lead Time, Satisfaction, or Both?

The trade off between short lead time and meeting customer requests, thus achieving high customer satisfaction, provides an interesting discussion. A brief summary of the subject can be found in Figure 6.3. However, the internal relationships between the two are probably not linear, and there are possibly many interactions that will be missed.

First, one consideration is in what way the goal of achieving a short dealership lead time harms customer satisfaction. Assume that the primary and only priority is to have a short lead time between car arrival at the dealership site and customer handover. To reduce the lead time, a proposal for customer handover would be sent early in the supply chain when the dealership has an initial ETA, enabling the customer to prepare financing and so on. Further, if the customer wishes the handover to occur days or even weeks later, the dealership would need to push and convince the customer, to a reasonable extent, to accept the earliest possible handover date from the customer's point of view. From this situation forward, two possibilities can occur. First, the initial ETA can have been correct, the car arrives at the dealership's site on the promised date without quality issues, and the car is ready for handover at the earlier specified date. In this case, the lead time at the dealership is reduced to a minimum. However, the second possibility is that the car does not arrive in time or arrives with quality issues, requiring repair and ordering of spare parts. In this case, the customer handover would need to be rescheduled, resulting in lower customer satisfaction. Nevertheless, assuming that the customer handover is rescheduled as early as possible, in accordance with the time needed to prepare the car, the lead time would not be prolonged compared to if the handover date was proposed after dealership arrival from the beginning. Thus, with this system of priorities, the lead time will be reduced to a minimum at all times. However, with this system, the overall customer satisfaction is reduced because of the impact of rescheduling and the extent to which rescheduling occurs, mainly driven by uncertainties in lead time and quality.

Second, assume that the only goal is to achieve as high customer satisfaction as possible, essentially ignoring the aspect of dealership lead time. As customer satisfaction depends on rescheduling and adhering to customer requests, these will be highly prioritised for this scenario. With these priorities, handover dates would not be proposed until the car has arrived at the dealership and inspected to ensure that it does not have any damages. This ensures that all uncertainties are minimised. Thus, uncertainties caused by cars that actually have delays or quality issues will impact the lead time for all other cars as well. In this scenario, the customer will only be contacted with a handover proposal once the dealership is sure that the proposed date can be delivered upon, thus ensuring that no rescheduling, at least from the dealership's side, will be required. Furthermore, all customer requests will be acted upon. For example, if the customer wants to delay the handover by one month, that will have to be taken into consideration. Moreover, other potential rescheduling initiated by the customer will also have to be adapted to. This system of priorities increases dealership lead times. However, the priorities will, at the same time, result in the highest amount of customer satisfaction, at least with regard to rescheduling and customer wishes.

As shown above, targeting the uncertainties can prove an excellent strategy to tackle the trade off between lead time and customer satisfaction. If uncertainties in lead time and quality were to be reduced, the dealerships could be instructed to propose a handover date earlier in the supply chain prior to the car arriving at the dealerships, resulting in a shorter lead time. At the same time, as the uncertainties are reduced, the need for rescheduling would be lessened as the dealerships could be more confident that the cars were to arrive at the correct time and in the anticipated quality state. Thus, the current trade off between lead time and customer satisfaction can be mitigated by improvements in information flow and collaboration amongst the actors in the supply chain, as well as by systematically addressing the quality issues. However, it is important to keep in mind that some uncertainties will always exist and that the trade off cannot be eliminated entirely. The argument is further supported by Min et al. (2005), Tuten and Urban (2001), Lewis and Talalayevsky (2004), and Barratt (2004), all declaring the importance of communication and information sharing for successful supply chain collaboration and, thus, operations.

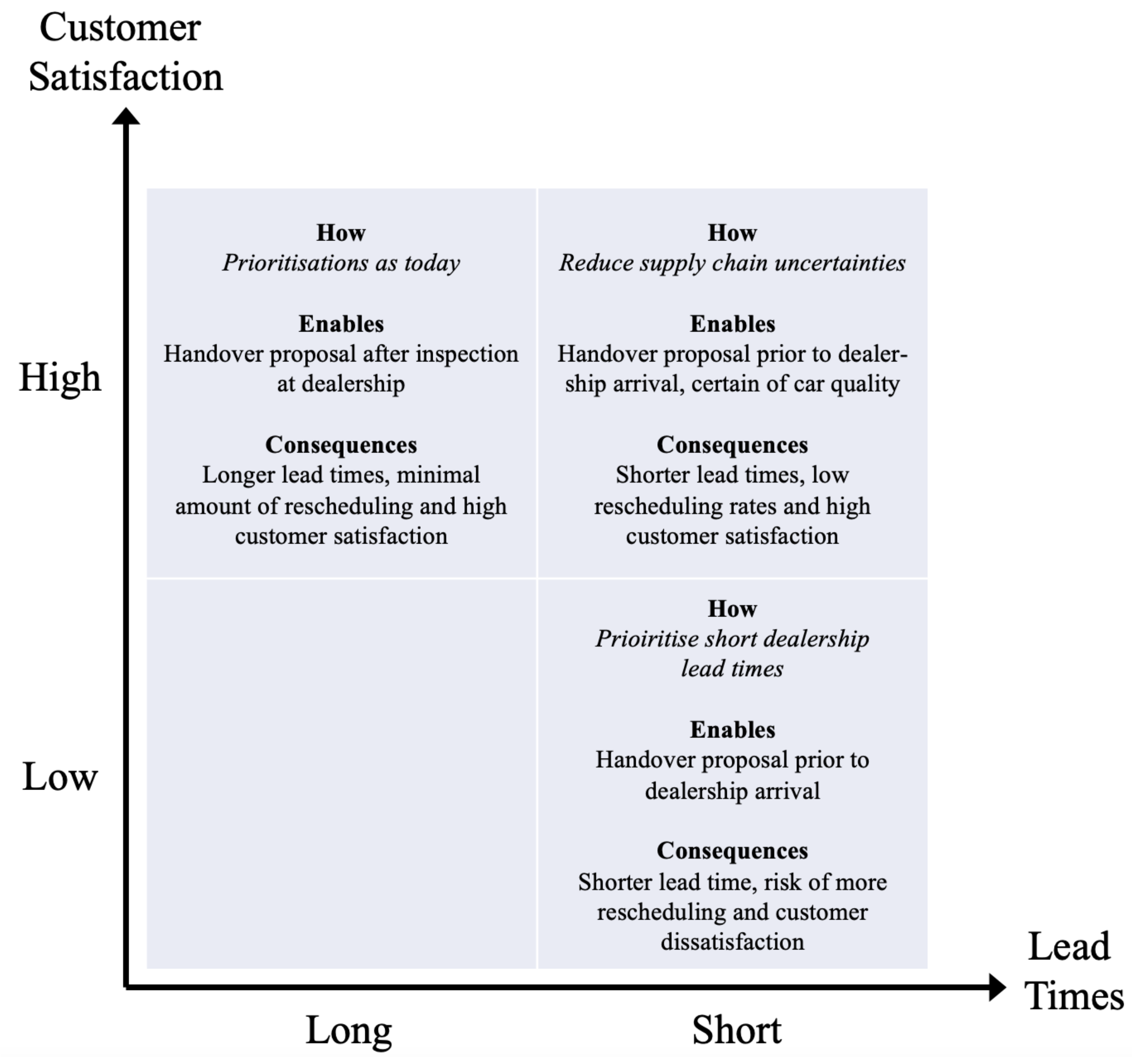

Figure 6.3: Trade off between lead time and customer satisfaction.

6.4 Internal Operations

This section starts of with discussing the lack of directives regarding communication and when to book handovers. Moreover, the need for central directives is reviewed.

6.4.1 Communication and Directives

It is a coherence between the MCs and the dealerships as both parties indicate that the internal communication between the two is well-functioning. In the dealership survey, the dealerships rate the internal communication at 4.0 out of 5.0. Thus, there is overall satisfaction with internal communication. Furthermore, it is worth noting the lack of standardisation in the communication flow between MCs and dealerships, as the frequency of meetings and contact varied to a rather large extent. Reasonably, there will always be some adaptation to specific markets and situations. However, clear directives and processes might be desirable, especially if the volume and company size will increase in the future. Such directives and processes might also be desirable when setting up the structure in new markets or with new dealerships.

The MCs state that the directives from the case company's HQ regarding when to book handover and lead time at the dealership stage are perceived as somewhat unclear. Further, many of the MCs state different directives. On the other hand, the dealerships state that the directives are clear in the dealership survey. 76% of the dealerships state that it is clear when to book handover, and 62% that it is clear what the dealership lead times should be. Most likely, the dealerships are referring to the directives that they have received from their respective market's MC, which are not necessarily the same as the MCs have received from the company's HQ. There are two possible reasons why this is the case.

The directives from the case company's HQ to the MCs have been unclear and thus miscommunicated to the dealerships. Alternatively, the MCs themselves find the directives from the company HQ to be unreasonable. This is argued by some MCs, who state that they had tried sending out handover date proposals before the car arrives at the dealerships, resulting in delays and rescheduling due to the car not arriving in time. This has resulted in the MCs communicating directives that they perceive as more reasonable at their market. This situation can be related to Norrman and Naslund (2019), where the issue of sub-optimisation is brought up. Norrman and Naslund (2019) argue that incentives should support the larger system and not contribute to local optimisation. Perhaps there is a need to develop new directives, which could be done in collaboration between the company HQ, the MCs, dealerships, and, of course, with the use of relevant data. Furthermore, new and clear directives can have an impact on lead times as they might change the behaviour and prioritisation of the dealerships. The use of contracts and directives to facilitate behavioural changes is supported by Narayanan and Raman (2004). However, it is important not to let such directives become a constraint for the development of the dealerships' operations, as argued by Gadde and Hulthén (2009).

7
Conclusion and Recommendations

This final chapter starts with presenting the conclusions from the study as well as reflections on the case company's supply chain process with regard to dealership lead times. This aims to answer the first research question: *What are the underlying reasons for lead time at the dealership stage?* The following subsection presents the second research question: *What actions are recommended to reduce downtime and improve lead time?* In the subsection, recommendations are presented, explained, and clarified. Finally, reflections are raised regarding how the study has developed over time concerning the iterative working process.

7.1 Conclusion

It has become clear that uncertainty in the case company's supply chain is one of the main driving forces of lead time at the dealership stage. The general directive from the company under investigation is that the dealership should propose a date for the customer handover before the cars arrive at the dealerships. This minimises the time between the cars arriving and the customer handover. The cars' unpredictable delivery dates and quality status have had requisite changes in the dealerships' processes. In particular, the dealerships have changed routines for when to propose the handover date to the customer, but also when slots for workshop activities are booked due to the dealerships not wanting unutilised capacity in their operations. This behaviour is related to the intent of not having to reschedule a handover date, as this is stated to have adverse effects on customer satisfaction. Thus, proposing the customer handover date after the vehicles arrive at the dealerships' sites has become a way to deal with the uncertainty. Additionally, there are uncertainties with the supply of extras/add ons that cause delays and increased lead time.

Furthermore, the lack of information flow between actors in the supply chain creates uncertainty. This includes the ETA not being updated frequently enough and quality issues found after inspection at the dealerships. However, the uncertainty experienced by dealerships can be either real, perceived, or both. The results imply that some factors causing uncertainty have improved over time. This suggests that even though reliability of the ETA has improved, dealerships continuously distrust the date, no matter its current reliability, due to previously experienced periods of inaccuracy. Nevertheless, with the present uncertainty experienced in the supply chain, there is a trade off between shorter lead times and customer satisfaction, and the dealerships have chosen to prioritise the latter.

The customer itself has emerged as a driving force for long lead times at the dealership stage. It is evident that listening to customer wishes and achieving customer satisfaction is highly important. This aspect of lead time is related to considering customer requests, such as desires to postpone the handover, as well as to minimise the number of rescheduled handover dates. The lead time caused by customer requests is difficult to decrease directly, as it is unrealistic to pressure the customers to allow the handover to occur at a particular date. Nevertheless, the earlier the customer receives a proposal for the handover date, the earlier the handover can occur as the customer is given the possibility to adjust and make arrangements. The aspect of customer satisfaction, on the other hand, relates yet again to the trade off with lead time; however, for this aspect, improvements are possible by quantifying the trade off and calculating the optimum state.

According to both the MCs and the dealerships, it is evident that directives from the case company's HQ regarding desired lead times at the dealership stage and when to book handover are somewhat unclear and incoherent. This is not a direct cause for lead time by itself, but more explicit directives might have an indirect effect by causing behavioural changes at the dealerships. Furthermore, communication and collaboration between the MCs and the dealerships differ between markets, showcasing a lack of standardisation across markets. Nevertheless, this is not a direct lead time driver, and the dealerships are satisfied with the current procedures. However, identifying a best practice to be used as a standard would most likely be beneficial, particularly with increasing sales volume, when setting up new dealerships, and when entering new markets.

Evidently, dealership lead time is a multifaceted issue. On the one hand, it is driven by customer requests and a desire to keep customer satisfaction at a maximum. On the other hand, it is a problem caused by uncertainties due to unreliability in the supply chain. Adding to the complexity are non-standardised processes where the markets all have unique collaboration arrangements and inconsistent directives to adhere to. Because there is not just one aspect causing lead time at the dealership stage, there cannot be just one solution. Below, recommendations are presented that will be essential in creating strategic improvements in the case company's supply chain.

7.2 Recommendations

Based on the results and the following discussion, the study has resulted in five recommendations:

1. Reduce uncertainties by improving reliability in lead times and quality.
2. Develop guidelines on how to handle the trade off between lead times and customer satisfaction.
3. Investigate the lead time aspect of customer adaptation.
4. Introduce coherent directives across markets.
5. Standardise market processes.

The order of the presentation of the recommendations does not suggest a prioritisation. The recommendations are further described below.

7.2.1 Clarification of the Recommendations

In this section, the recommendations are described in more detail.

1. Reduce uncertainties by improving reliability in lead times and quality

The uncertainties in the supply chain regarding lead times and quality needs to be addressed. Therefore, the suggested solution is to focus on removing the uncertainties by increasing the reliability of the lead times and thus the ETA, resulting in the present unpredictable status of the delivery dates to decrease, allowing the dealerships to plan their activities and operations at an earlier stage. Further, to reduce the uncertainty caused by the quality aspect of the vehicles, the premier solution is naturally to reduce the number of damages to the vehicles occurring during transport.

However, as uncertainties are difficult and expensive, if not impossible, to remove entirely, they can be reduced by improving the quality of the information flow in the supply chain. This can be achieved by increasing the reliability of the ETA by updating it dynamically and, if possible, continuously. For example, this can be achieved if the carrier informs the case company that the car is to be retrieved and that the transport commences at a specific date, providing a more accurate ETA. Furthermore, if updated continuously, the ETA could be integrated with the carriers' internal systems, providing a more precise delivery date updated during transit. Additionally, quality issues could be handled prior to dealership arrival by conducting quality inspections earlier in the supply chain, either at the EH or at the MS. Alternatively, knowledge of quality issues could be added to the EIS, providing dealerships with information regarding which cars that need repair and thus enabling planning of the subsequent resources in terms of workshop activities and replacement parts that are required.

Moreover, one possibility is that the uncertainties in the supply chain are caused by perceptions, rather than actual issues with lead times and quality being as unreliable as is argued for. In this scenario, the solution is to convey the actual reliability to the MCs and dealerships by communicating the correct data and hence changing their perception of the uncertainty.

2. Develop guidelines on how to handle the trade off between lead times and customer satisfaction

A solution to address the identified trade off is to investigate what aspect should be prioritised, assuming some uncertainty always exists. Currently, the dealerships prioritise customer satisfaction by avoiding rescheduling at the expense of increased lead time. Aspects such as the cost of dealership lead time and the cost of negative customer satisfaction caused by rescheduling need to be evaluated and calculated to determine what should be prioritised. This would result in a more qualified decision regarding how early handover should be addressed and what amount of rescheduled handovers that are acceptable.

3. Investigate the lead time aspect of customer adaptation

The study shows that special customer requests and adaptations are significant drivers of dealership lead times. One way to address this issue is to allow the customer to inform at an earlier stage when it wants the car to be delivered. Another proposition is for the dealership to inform the customer that the car needs to be retrieved within a specific time frame after arrival. A further investigation of this issue is beyond the scope of this study; however, the aspect should be analysed further due to its impact on dealership lead times.

4. Introduce coherent directives across markets

Currently, the directives regarding handover and lead times are unclear and incoherent across markets. Therefore, new directives should be developed in accordance with the present situation in terms of uncertainty and dealership lead times. These directives should aim to be ambitious but at the same time reasonable to encourage efforts to reduce lead times. For example, suppose it is decided that some rescheduling of handover dates is acceptable and that a handover proposal should be sent before dealership arrival. In that case, this should be communicated as a directive, enforcing changes in the dealerships' processes.

5. Standardise market processes

During the study, it was found that currently, the collaboration and communication processes between the MCs and the dealerships are often market specific and lack standardisation. Considering a continuous growth and expansion of the case company's operations, standardisation and identification of best practices in processes are desirable. In new market entries, a standardised and predefined *modus operandi* would facilitate a more seamless launch and set up of the supply chain structure. Furthermore, standardisation allows for dispersion of best practices and comparisons between markets.

7.3 Reflections

When the project was launched, the initial focus was on reducing capital tie-up by improving the lead times at the dealership stage of the supply chain. It was found in the data that lead times at dealerships are longer than what the company under investigation desires. The preliminary hypothesis was that operations at the dealerships caused the relatively long lead times. As it was clear that the lead times varied between dealerships and markets, the decided approach was to investigate a multitude of dealerships for variances in operations and thus identify best practices. However, during interviews with MCs, and later through the dealership survey, it soon became clear that the leading causes for lead time lay outside the dealerships' control and operations. Uncertainties in delivery dates and quality emerged as primary drivers for lead time, and aspects of customer satisfaction and requests quickly materialised as crucial from the markets' perspectives. Furthermore, it became apparent that the cars are often financed relatively long before customer handover. Hence, there is no significant capital tie up at the dealership stage. In effect, the study progressed from focusing on capital tie up and differences in operations at the dealerships, to reducing lead times by analysing the broader supply chain encompassing the case company, carriers, and dealerships. Finally, the study also ended up investigating the aspects of customer satisfaction and adaptation.

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A
Appendix

This Appendix contains detailed results and key takeaways from the interviews with the Market Coordinators (MCs) in each studied market. However, the Appendix is classified due to requests from the case company.

B
Appendix

B.1 Interview Template - Market Coordinator

Questions are in supply chain order.

General Questions:

- What are your responsibilities as a Market Coordinator?
- Can you explain how the collaboration with the dealerships look like?
  - How does the information exchange work between you and the dealerships?

European Hub (EH):

- Are you planning handover already when the cars are in the European Hub?
  - At what stage in the supply chain is the ETA relevant for you as a Market Coordinator and handover booking at dealerships?

Market Storage (MS):

- What is determining whether a car is given a dealer hold or that it passes straight through the Market Storage?
  - Are all cars given a dealer hold as default?
    - What determines that you release the car? (Dealership capacity or ETA?)
    - What does a dealership know early in advance? When are they informed of incoming orders? (For example that week (40), 20 cars are expected to be delivered to the dealership)
- Are the lead times from the European Hub to the Market Storage reliable?
  - Is the ETA correct?
  - Does this affect handover booking?

At the Dealership:

- What are the main drivers for lead time at the dealership stage?
  - How is the supply chain for tow bars etc.? Is the supply chain situation in this area affecting dealership lead times?
  - Is the car's registration process a driver for the lead time?
  - Capacity issues at the dealerships?
    - Dealership priorities (different car brands etc.)? Differences in dealership lead times regarding how many cars from the studied company they are processing (% of total amount)?

  - Quality issues with the cars?
  - Rescheduling (both from the dealership and from the customer)?

  Are there directives for how long the dealership lead time should be (for the specific market)?
  - Are deviations from the directives reported?
  - Why are the directives not followed (if not)?
- Are there differences between internal dealerships owned by the [case company] and external ones?
- Are there differences between low volume and high volume dealerships?
  - Both in terms of total number of cars and % of cars from the [case company]
- How impactful is it that deliveries match the ETA? Also, regarding time of day?
  - How impactful is it for the dealership lead time and handover booking that it is on time in comparison to one day late from ETA?
  - If impactful, would it be useful for the dealership if the ETA were also indicating time of day?
    * If impactful, how late can the the ETA be updated to allow the dealership to adapt/plan?

Handover Booking:
- What determines when the handover is booked?
  - What is the cause when a dealership books handover late (for example several days after the car arrived to the dealership)?
  - Why does the handover booking occur in different phases of the supply chain (such as when the car is in the European Hub, in transit, or at the dealership)?
- What directives do you and the dealers have regarding booking of handover?
  - Do the dealerships follow the directives?
  - Do all the dealerships have the same directives?
- Is rescheduling of the handover causing any problems?
  - Is the rescheduling done by the customer or the dealership?

Final Questions:
- When is the car paid by the customer? How long before handover?
- How do you believe the lead times could be reduced?
  - How much could the lead times be reduced?
- Questions regarding the survey:
  - Are some dealerships more suitable to answer the survey? If so, which ones?
  - Anything you want us to include in the survey?
- If anything is unclear or if we have follow-up questions, would it be possible to conduct interviews with select dealerships?

B.2 Survey - Dealerships

Logistics Survey Dealerships

Purpose

Hi,

We are two Master's Thesis students at Chalmers University of Technology in Gothenburg, Sweden, working together with the [case company] to find improvements in the supply chain and operations at the dealership stage. The results from the survey will be used to better the operations and assist you in your collaboration with the [case company].

The results are anonymous and no questions are mandatory, however the more questions you answer, the more useful the result will be for both yourself, us, and the [case company].

They survey should take approximately 10 minutes to answer. Your answers are very appreciated, both from us and the [case company].

Best regards,
Johan & Ossian

Question 1: Which market are you in?
Choose from:

Market M1
Market M2
Market M3
Market M4
Market M5
Market M6
Market M7
Market M8
Market M9

Lead Times and Information

These questions regards the cars before they have arrived at your dealership/handover location.

*Question 2: How is your overall satisfaction with the **carrier(s)** (the company delivering the vehicles to your location)?*

For example: punctuality, communication, safe handling of vehicles etc.

1 = Not at all satisfied
5 = Very satisfied

Rate from 1 to 5.

*Question 3: Comments on **Carrier(s)**?*

*Question 4: How **reliable** is the preliminary delivery date (**ETA**) in the [external information system (EIS)]*

1 = not at all reliable
5 = very reliable

Rate from 1 to 5

*Question 5: Are you **using** the estimated time of arrival (**ETA**) in your operations/planning*

Choose from:

Yes
No

*Question 6: How do your perceive the **quality** regarding information from the [case company]/carriers regarding **lead time delays** and **issues** in the supply chain?*

1= Not at all satisfied
5 = Very satisfied
Rate from 1 to 5

*Question 7: Comments on **lead time information** and/or **ETA**?*

Dealership Operations and Extras

These questions regards the cars when they have arrived at your dealerships/handover location.

*Question 8: To what extent has **quality issues** with the [case company] cars led to **changes** in your processes?*

1 = Not at all
5 = Very much
Rate from 1 to 5

*Question 9: Can you give an/some **examples(s)** of how you **changed** your **processes** to deal with **quality issues** on the cars?*

*Question 10: To what extent does your **capacity** in **workshop activities affect** the **time** from car arrival to customer handover?*

1 = Not at all
5 = All the time
Rate from 1 to 5

*Question 11: To what extent does your **capacity** in **handover slots affect** the **time** from car arrival to customer handover?*
1 = Not at all
5 = All the time
Rate from 1 to 5

*Question 12: Comments on **capacity** in **workshop** and **handover slots**?*

Handover

These questions regards the process of booking handover with the customer.

*Question 13: **When** do you **send out** a proposal for customer handover date?*
Choose from:

>5 days before dealership arrival
1 to 5 days before dealership arrival
Same day as dealership arrival
1 to 3 days after dealership arrival
>3 days after dealership arrival

*Question 14: **What** is the **deciding factor ("trigger")** for when to book handover, and **why** is that?*

*Question 15: What is your main priority when **proposing customer handover date**?*
Choose from:

Short time between car arrival and customer handover
Car being ready for handover (to avoid rescheduling)
Customer preferences (if already known)
Capacity utilisation of handover bay
Availability of Handover Specialists
Other (Please Describe)

*Question 16: How do you perceive the directives from the [case company] regarding **when to book handover**?*
Choose from:

Clear
Unclear
Don't know
Other (Please Describe)

*Question 17: How do you perceive the directives from the [case company] regarding **the maximum number of days between car arrival and customer handover**?*
Choose from:

Clear
Unclear
Don't know
Other (Please Describe)

Communication

These questions regards your communication with the [case company].

*Question 18: How satisfied are you with the **regular contact** with the [case company] (for example weekly meetings), regarding forecasts, changes, directives, etc.?*

1 = Not at all satisfied
5 = Very satisfied

Rate from 1 to 5

*Question 19: How **often** do you have **contact** with the [case company]? (For example daily, weekly, monthly, etc.)*

Final Questions

These last questions is a chance for you to add suggestions and ideas to topics that can be useful for us to understand what can be done to improve operations.

*Question 20: How much does the following aspects affect the **time** from **car arrival** to customer **handover**?*

Check box:

	Don't know	Not at all	Some	Much	Very much
Lead time uncertainty					
Quality issues					
Workshop capacity					
Handover capacity					
Customer requests					
Extras (tow bars, winter tires, etc.)					
Other (describe below)					

*Question 21: **If other**, please specify.*

*Question 22: Do you have any **suggestions** for how to **reduce** the **time** between car **arrives**. at your location and customer **handover**?*

*Question 23: What do you **expect** from the [case company], and what could be **improved**?*

*Questions 24: Is there anything specific that you **appreciate** in your collaboration with the [case company]?*

*Question 25: What would **motivate** you to perform the customer handover more quickly?*

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