



**CHALMERS**  
UNIVERSITY OF TECHNOLOGY



# The increased value of last-mile logistics in the e-commerce value chain

The perspective of logistics actors on the Swedish market

Master's thesis in Supply Chain Management

CARL-JOHAN HAMMARSTEDT  
PHILIP LAVESTÅL

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS  
DIVISION OF SUPPLY AND OPERATIONS MANAGEMENT

---

CHALMERS UNIVERSITY OF TECHNOLOGY  
Gothenburg, Sweden 2021  
[www.chalmers.se](http://www.chalmers.se)  
Report NO. E 2021:125

REPORT NO. E 2021:125

# The increased value of last-mile logistics in the e-commerce value chain

The perspective of logistics actors on the Swedish market

CARL-JOHAN HAMMARSTEDT  
PHILIP LAVESTÅL



Department of Technology Management and Economics  
Division of Supply and Operations Management  
CHALMERS UNIVERSITY OF TECHNOLOGY  
Gothenburg, Sweden 2021

The increased value of last-mile logistics in the e-commerce value chain  
The perspective of logistics actors on the Swedish market  
Carl-Johan Hammarstedt  
Philip Lavestål

© CARL-JOHAN HAMMARSTEDT, 2021.  
© PHILIP LAVESTÅL, 2021.

Report no. E2021:125  
Department of Technology Management and Economics  
Chalmers University of Technology  
SE-412 96 Göteborg  
Sweden  
Telephone + 46 (0)31-772 1000

Gothenburg, Sweden 2021



The increased value of last-mile logistics in the e-commerce value chain

- The perspective of logistics actors on the Swedish market

Master's thesis in supply chain management

CARL-JOHAN HAMMARSTEDT and PHILIP LAVESTÅL

Department of Technology Management and Economics

Chalmers University of Technology

## Summary

The Swedish e-commerce market has increased dramatically during the last years with an astounding 40% growth in sales in 2020. The development has been ongoing for a long time, but was accelerated by the COVID-19 pandemic outbreak which restricted the possibilities of shopping in physical stores, resulting in customers using digital substitutes. This has resulted in high pressure on logistics service providers to keep up with the growth and offer valuable last-mile delivery solutions to the end customers.

The aim of the thesis was to investigate in what ways the last-mile delivery solutions add value to the e-commerce value chain, and what aspects of the customer interaction related to last-mile delivery that was perceived as most value-adding by the logistics actors. To realize the aim, a literature study was conducted to investigate the current research state of the topics after which 12 semi-structured interviews were conducted with 10 different logistics companies, consulting firms and research institutes.

The findings show that the last-mile delivery solutions create value by offering deliveries that reduce the effort needed by the customer to receive the parcel. Furthermore, as the e-commerce customers purchase the items with limited information, the availability of convenient return processes is found to be an important aspect in order to convince the customer to go through with the purchase. When the number of e-commerce customers grows, so does the need for different delivery options to suit the varying demands. The most important aspects of the delivery are found to be convenience and the availability of different delivery options.

We conclude that the value created by logistics service providers manifests in the way it provides the customer with deliveries and returns that requires less effort compared to shopping in physical stores. The main aspect of the interaction is the ability to choose between different delivery solutions to choose what is most convenient in the specific context of each purchase as well as to be able to change the type, or time of delivery if the circumstances change.

**Keywords:** *E-commerce, Last-mile delivery, Logistics service providers, Logistics value, Customer experience*



## Acknowledgements

We would like to express our gratitude to our supervisor Lokesh Kumar Kalahasthi, Postdoctoral researcher at the Department of Technology Management and Economics at Chalmers University of Technology, for his feedback, guidance and valuable support in this project.

We would also like to thank our supervisor Niklas Arvidsson, Senior researcher at the Swedish National Road and Transport Research Institute (VTI), for giving us the opportunity to write our master thesis at VTI and especially for his time, endless support and for sharing his knowledge regarding our research topic.

Lastly, we would like to express our deepest appreciation to all interviewees for the time and knowledge they have shared with us during a very hectic spring.

Philip Lavestål  
Carl-Johan Hammarstedt

## **Glossary/Abbreviations**

LSP - Logistics Service Provider

B2B – Business-To-Business

B2C – Business-To-Consumer

O2O - Offline to Offline

TBMP - Time-Based Marketing Promise

MVT - Margin Value of Time

3PL - Third-party Logistics Provider

NPS - Net promoter score

SD-logic - Service-Dominant Logic

VMT - Vehicle Meters Traveled

LEFV - Light Electric Freight Vehicle

LS – Last-mile Solutions company

BGC - Business Growth Consultant

CR - Commerce Research

LC - Logistics Consulting

ROX - Return on user experience

KPI - Key Performance Index

LMD - Last-Mile Delivery

UDV - Unmanned Delivery Vehicles



# Table of Content

<b>1.INTRODUCTION.....</b>	<b>1</b>
1.1 BACKGROUND .....	1
1.2 AIM AND RESEARCH QUESTIONS .....	2
1.3 DELIMITATIONS .....	3
<b>2. LITERATURE REVIEW.....</b>	<b>4</b>
2.1 E-COMMERCE DEVELOPMENT .....	4
2.1.1 <i>Describing e-commerce</i> .....	4
2.1.2 <i>Current e-commerce trends in Sweden</i> .....	6
2.1.3 <i>E-commerce returns</i> .....	9
2.2 LAST-MILE LOGISTICS AND THE SUPPLY CHAIN .....	11
2.2.1 <i>The evolution of supply chain management</i> .....	11
2.2.2 <i>Last-mile logistics</i> .....	12
2.2.2.1 <i>Service points</i> .....	15
2.2.2.2 <i>Home deliveries</i> .....	16
2.2.2.3 <i>Parcel lockers</i> .....	17
2.2.3 <i>Environmental sustainability in last-mile logistics</i> .....	17
2.3 UNDERSTANDING VALUE CREATION.....	19
2.3.1 <i>Customer experience and customer journey</i> .....	19
2.3.2 <i>Service-dominant logic</i> .....	21
<b>3. RESEARCH METHODOLOGY.....</b>	<b>23</b>
3.1 RESEARCH STRATEGY .....	23
3.2 RESEARCH DESIGN.....	23
3.3 LITERATURE REVIEW.....	24
3.4 INTERVIEWS .....	24
3.5 DESCRIPTIONS OF THE INTERVIEWED COMPANIES .....	26
3.5.1 <i>Logistics Service Providers</i> .....	26
3.5.2 <i>Logistic Solutions companies (LS)</i> .....	27
3.5.3 <i>Research and consulting companies</i> .....	28
3.6 DATA ANALYSIS .....	30
3.7 REFLECTION ABOUT CHOSEN METHODOLOGY .....	30
<b>4. EMPIRICAL FINDINGS.....</b>	<b>32</b>
4.1 E-COMMERCE GROWTH AND THE IMPLICATIONS ON LAST-MILE DELIVERY .....	32
4.1.1 <i>Availability of different delivery options</i> .....	35
4.1.2 <i>Challenges of performing sustainable last-mile deliveries</i> .....	36
4.2 CUSTOMER INTERACTION IN LAST-MILE DELIVERY .....	38
4.2.1 <i>Using feedback to improve service quality</i> .....	40
4.2.2 <i>Descriptions of customer interaction</i> .....	40
<b>5. DISCUSSION.....</b>	<b>45</b>
5.1 VALUE CREATION IN LAST-MILE DELIVERY.....	45
5.1.1 <i>Value creation through innovation</i> .....	46
5.1.2 <i>Value creation through delivery options and returns</i> .....	48
5.1.3 <i>Sustainability issues with last-mile deliveries</i> .....	51
5.2 CUSTOMER INTERACTION AND ITS EFFECTS ON THE CUSTOMER EXPERIENCE .....	53
5.2.1 <i>Important aspects of the interface</i> .....	53
5.2.2 <i>Improving value creation of the interaction</i> .....	55
5.3 ASPECTS OF VALUE CO-CREATION .....	57
<b>6. CONCLUSION .....</b>	<b>58</b>
6.1 ANSWERING THE RESEARCH QUESTIONS .....	58
6.2 RESEARCH CONTRIBUTIONS .....	59
6.3 SUGGESTIONS FOR FUTURE RESEARCH.....	59
<b>REFERENCES.....</b>	<b>60</b>

<b>APPENDICES .....</b>	<b>65</b>
APPENDIX I - INTERVIEW GUIDE .....	66

# 1.Introduction

This chapter provides the reader with a brief introduction to the problem. The background is then formulated into an aim and research questions that the thesis aims to resolve. Lastly, the delimitations of the scope are presented.

---

## 1.1 Background

The Swedish early adoption of e-commerce has its origin in the large-scale early adoption of the internet in the 1990s which enabled Swedish businesses to digitalise their operations and introduce e-commerce (Allhorn, 2017). This laid the foundation for implementing e-commerce and Sweden has been considered a mature e-commerce market. The number of parcel deliveries per year in Sweden has doubled between the years 2006 and 2018 and the Swedish market is dominated by four large logistics companies; Postnord, DHL, DB Schenker and Bring (Konkurrensverket, 2018). Similar trends can be seen globally and in the last decade, the traditional trade has shifted towards e-commerce wherein 2020 alone, the e-commerce sales grew by 27,6% worldwide which constitutes a total sales of 4.280 trillion US dollars (eMarketer, 2021a). In 2020, the Swedish e-commerce market had a 40% increase indicating that the Swedish development is moving forward faster than the average country (Postnord, 2020c).

This results in a growing need for parcel deliveries. New business models have emerged and there has been an increasing demand for smart logistics solutions. The last leg of the business-to-consumer (B2C) delivery service, often referred to as the last-mile delivery (LMD) and is regarded as the most complex and costly part of the delivery chain due to its inefficiency. The inefficiency itself stems from the high customer demand on narrow delivery time frames, the amount of stops with low drop sizes, and the congestion in urban environments. The last mile is not only considered complex and inefficient but also bears a substantial share of the total cost of the distribution. According to Joerss et al. (2016) and Gevaers et al. (2011), the cost of the last mile constitutes more than 50% of the total cost. Offering free shipment has become ubiquitous and necessary for e-retailers in order to stay competitive, whilst the cost for shipping has not diminished. This means that at least one actor needs to bear the cost for these shipments, whether it is the e-retailer, the logistics service provider, or the end customer through higher price tags on the products that they purchase.

Simultaneously, as the urbanization process where a large percentage of the population is moving towards cities, the need for efficient mobility and accessibility in urban areas will continue to grow. According to the United Nations (2018), approximately 70% of the world's population is expected to live in urban areas by 2050. The trends of e-commerce have had a startling increase as a result of the global COVID-19 pandemic, accelerating the ongoing shift towards shopping online. Simultaneously, the growing consciousness regarding sustainability has increased the need for sustainable delivery methods and forces the entire logistics sector to transform to lower its greenhouse gas emissions.

These changes have increased the demand for more sustainable and smart logistics solutions to cope with increased demand for logistics services, and logistics service providers (LSP) are under heavy pressure to manage the transformation. The

traditional last-mile logistics solutions consist of parcel pick-up in service points and home deliveries. Recently, new last-mile delivery solutions have been introduced such as parcel lockers and unattended home deliveries with a high degree of customization and without the need to sign the receipt, and conceptual solutions such as drone deliveries are being developed. Not only is the increased number of parcel deliveries putting strains on the logistics service provider, but the demand for multiple delivery methods, free returns, and short time windows to execute the delivery is further adding complexity to the last-mile logistics. With these changes, the role of the logistics service provider has changed from being a transporter of goods to becoming an actor that takes on an important role in creating a good customer experience in the interface with the customer (Xiao et al., 2018). Furthermore, the value-adding effects of last-mile delivery services is increasing the importance of last-mile logistics in the e-commerce value chain.

As new channels emerge and existing ones develop, the interface, which consists of the digital interactions between the logistics service provider and the end customer, changes as well. The interface can be viewed as touchpoints in the customer journey where the customer satisfaction is determined. Additionally, the delivery can be seen as a substitute for the interaction with an employee in a physical shop and has a large impact on the overall customer satisfaction. As the shift towards e-commerce is expected to grow, the points of interaction between the last-mile logistics service provider and the customer becomes significantly more important for a successful customer experience, where a successful delivery can determine if a customer will return as a customer. The ongoing COVID-19 pandemic is further forcing the logistics service providers to adapt to the increasing demand, while customer expectations are continuing to rise.

In light of this development, this master thesis is a part of the project *Innovative sustainable urban last-mile: small vehicles and business models* which is a collaboration between research institutes from the Nordic countries. The purpose of the project is to increase the sustainability of the urban last-mile deliveries and improve the delivery services associated with e-commerce.

## 1.2 Aim and research questions

With the ongoing shift away from the retail market and with the rapid growth of e-commerce, which is accelerated by the ongoing COVID-19 pandemic, the market of last-mile logistics is under heavy pressure to adapt and evolve. To gain a better understanding of the recent changes, the thesis aims to provide insights on the last-mile delivery solutions available on the Swedish market and how these solutions add value to the e-commerce value chain. Additionally, the thesis aims to investigate what aspects of the *logistics actor-customer* interaction that is viewed as the most value-adding by the logistics actors. This knowledge can help different logistics actors and supply chain managers understand how they can work to improve their services and increase customer value to further strengthen their position as a key actor in the e-commerce value chain

The report focuses on the interaction between the logistics service provider and the end customer, as the role of the logistics service provider has evolved from an indiscernible transporter of goods to a visible service provider with an impactful role on

the customer experience. The increased value creation of the logistics service provider will be analysed using service-dominant logic to describe the way the logistics services create value in the e-commerce value chain. The report further aims to bring clarity as to how logistics service providers can meet the increasing demands from customers in a sustainable way, whilst ensuring the seamless experience that is sought by customers.

To define the issue of investigation, the following research questions have been formulated:

- › *In what ways do last-mile delivery solutions offered by logistics actors add value to the e-commerce value chain?*
- › *According to logistics actors, what aspects of the customer interaction with the logistics service provider contribute the most to a valuable customer experience?*

### **1.3 Delimitations**

To create a manageable scope, some delimitations were created to increase the clarity of what is included in the study. The Swedish market was chosen as a geographical area because of the author's familiarity with the market and because of the extensive development of the Swedish e-commerce and last-mile delivery sectors. As the logistics service providers carry out services to a range of different customers, the segment that is most affected by the development of last-mile delivery is business-to-consumer. In regards to this, the business-to-business and customer-to-customer segments were disregarded.

## 2. Literature review

This chapter will provide a literature review of several relevant topics related to e-commerce, last-mile logistics and value creation. The three main areas and their related subthemes are shown in Figure 1. The review includes specific descriptions of the Swedish market, the development of supply chains as a strategic tool, and defining concepts such as value creation and customer experience.



**Figure 1.** *The three identified areas constituting the literature review.*

### 2.1 E-commerce development

This section provides a description of the e-commerce development and the current e-commerce trends in Sweden. The section ends with explaining the implications of e-commerce returns and different return management strategies.

#### 2.1.1 Describing e-commerce

Over the recent years there has been a steadily growing shift from traditional trade towards e-commerce around the world (Vakulenko et al., 2019; Postnord, 2020c). E-commerce is the sale of physical products through the use of a digital platform, from either a business entity to another (B2B), or from a business entity to a private consumer (B2C). In 2019, global e-commerce reached 3.35 trillion U.S. dollars and stood for 13.6% of the total global retail sales and is expected to grow past 6 trillion U.S. dollars by 2024 according to eMarketer (2021). In the EU, the number of consumers that have purchased services or goods online has increased from 43% in 2011 to 72% in 2020 (European Commission, 2012; Eurostat, 2021). The traditional retail channels are still accounting for a majority of the sales, but the trend towards online shopping calls for new business models and logistics solutions. In traditional shopping, the consumer must travel to the store to purchase goods compared to when buying from an e-retailer where you can choose from multiple different types of last-mile deliveries. Other factors that influence the overall benefits for e-commerce are the availability of a larger selection of items from all over the world, easy price comparison and low switching costs if a better alternative is found and availability 24 hours a day which create a convenient experience for the customer (Khan, 2016).

A recent study by Guthrie et al. (2021), investigating the evolution of online purchasing consumer behaviour during the pandemic depicts the implications that the COVID-19

pandemic has had on consumer behaviour and their perception of e-commerce benefits. Furthermore, the fact that consumers have found new behavioural habits when it comes to online shopping, that may maintain after the pandemic is over, is considered to further evolve the e-commerce sector. Visser et al. (2014) bring forth additional factors that play an important role in the shift from traditional brick-and-mortar shops to e-commerce, namely; Younger people are used to the internet and remote ordering, the older population are discovering the convenience of internet shopping and the use of smartphones enables internet shopping while on the go. The previously reticent e-commerce customers are starting to adopt online shopping, so-called late adopters, has been a contributing factor to the increased e-commerce sales during the COVID-19 pandemic (Guthrie et al., 2021). Overcoming skepticism and learning about the convenience of online shopping may contribute to late adopters continuing their purchasing behaviour post-pandemic as well.

A trend among e-retailers is the 'offline to online' or O2O, which is when a traditional brick-and-mortar store is used for display only where the customers can try out the products or get additional information about the products while the purchase is still performed online (Visser et al., 2014). This gives the customer the satisfaction of seeing and feeling the product before purchasing it, which is one of the key factors of traditional shopping preferences.

The growth in e-commerce since the early 2000s has transformed the distribution of physical goods and the impact on how the deliveries are organized has become a key factor behind many innovative business models (Viu-Roig & Alvarez-Palau, 2020). The delivery service offered by the logistics service providers is becoming more customized for each individual customer which requires diversification in the type of delivery methods and channels that are part of the offering. Further complexity to the logistics structure is added through the increased number of returns, which stems from the growing demand for free return policies from the customers (Källgren et al., 2021). In a study by Postnord (2019), eight out of ten online shoppers in the Nordic region say that having free returns influences the decision on what e-retailer to buy from. Furthermore, having an inefficient or unclear return process from the customer perspective can deter customers from shopping online and hence needs to meet or exceed their expectations (Lim et al., 2018; Postnord, 2019).

The rapid advancement towards e-commerce is largely driven by the progress that has been made in terms of e-fulfillment. de Kervenoael et al. (2020) bring forth technological innovations such as vehicle route optimisation in last-mile deliveries as one of the contributing factors. To understand the emergence of online shopping one needs to look at its history.

Laghaei et al. (2015) describe four types of home shopping that eventually led up to what we today call e-commerce.

1. Catalog shopping has been used for over 100 years but eventually became too costly and inconvenient.
2. Television shopping grew rapidly during the 1980s through the increasing use of cable TV.
3. Telemarketing, both salespeople calling consumers with product offerings as well as consumers calling the retailer.

4. E-commerce. The internet had its first commercial breakthrough in 1994 and the establishment of Amazon and eBay as pioneers in 1995 is what really gained market penetration and brought the benefits of online shopping to the consumer.

Even though some of the different types of shopping from home are still prevalent in some parts of the world, the Swedish home shopping market is predominantly consisting of e-commerce.

Consumers are playing a bigger part in the last-mile logistics services as their power to dictate the method of delivery has increased (Wang et al., 2019). Furthermore, their participation in logistics activities is becoming a key to success for the e-retailers and logistics service providers. Value co-creation between consumers and e-retailers is becoming increasingly important to achieve sustainable competitive advantage and the logistics activities play a major role in this (Wang et al., 2019). Offering time-based marketing promise (TBMP) to the consumer consists of both lead time from order to delivery but also at what hour of the day the parcel shall be delivered (de Kervenoael et al., 2020). These spatial constraints are strong drivers for the innovative solutions and value creation within urban last-mile deliveries that are becoming more prevalent on the market (de Kervenoael et al., 2020). Increasing demands from the customers in terms of personalized service offerings, flexible delivery options as well as a variety of purchase conditions are further influencing the e-commerce market. (Postnord, 2020a; Vakulenko et al., 2019). These demands act as drivers for the e-commerce business and force both the e-retailers as well as the logistics service provider to develop new innovative solutions in order to meet these demands (Vakulenko et al., 2019). However, for the innovations to be regarded as successful, they need to be applied and tested in a real-time environment and further help increase the customer experience.

### **2.1.2 Current e-commerce trends in Sweden**

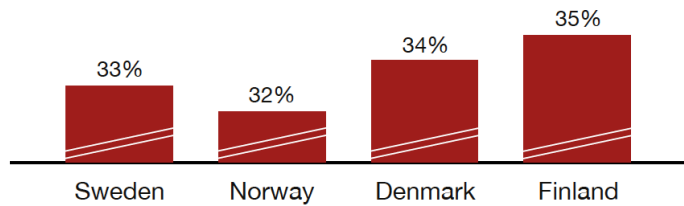
The annual revenue from e-commerce reached 122 billion Swedish crowns in 2020, which compared to 2019 results in a growth of 35 billion. The amount of growth in terms of revenue between 2019 and 2020 equals the total revenue in e-commerce in 2012 (Postnord, 2021). According to Postnord (2019), the projected growth of e-commerce in Sweden for 2020 was 11%. However, after the first quarter, the e-commerce business had already grown by 16% and continued to grow by 49% during the second quarter compared to 2019. During the third quarter, the spread of COVID-19 had decreased quite significantly, but the increase in e-commerce still increased by 39%. During the last quarter of 2020, the second wave of the pandemic had hit Sweden and with the conjunction of Christmas, the growth reached 56%.

According to Postnord (2021), a large factor that contributed to the total growth of 40% in the e-commerce business during 2020 was the pandemic and the environmentally imposed constraints by the Swedish government. In a study conducted in April 2020 by PWC (2020) the Nordic consumers had started to shift to a higher share of online shopping during the COVID-19 pandemic and were inclined to continue shopping more online afterwards as well which is shown in Figure 2. However, the more recent report

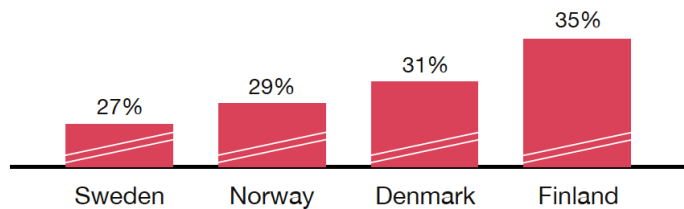


from Postnord (2021) showed that nine out of ten between the ages 18-79 have been shopping more online since the pandemic broke out than previously.

**Consumers that have shifted to a higher share of online shopping during the pandemic**  
% consumers



**Consumers that will keep shopping more online after the pandemic**  
% of consumers shifting online



**Figure 2.** Shift in the consumer trends as a result of the pandemic PWC (2020)

According to Postnord (2021), almost every industry operating in the e-commerce landscape grew by an amount that otherwise would have taken them at least three years. In terms of how large share of the total revenue within one industry is being purchased online, home electronics has the significantly biggest share with 43%, whilst within clothing and footwear, e-commerce generates 30% of the total revenue. Thereafter comes sports and leisure products at 18%, pharmaceutical products at 16%, building materials at 14%, home furnishings at 11%, and lastly groceries at 4% (Postnord, 2021).

Looking at the e-retailers, more than two-thirds of the companies that participated in the Postnord-survey said that they had invested more and increased their e-commerce capacity during the COVID-19 pandemic. They explain that they are certain the high levels of e-commerce in 2020 will persist, motivating their investments by future benefits.

Online shopping within the grocery industry saw an astounding 95% growth during 2020 where in-store pick up and home delivery are the available delivery methods. Home deliveries grew by 55% compared to the last year whilst in-store pick up grew by 173% (Postnord, 2021).

From the consumer perspective, multiple factors act as drivers for the increasing growth in e-commerce over the last decade. According to a survey on Swedish consumers by NETS (2021), the most common reason for shopping online is *convenience* (35%), followed by a *larger assortment* (14%) and *lower prices* (13%).

However, due to the COVID-19 pandemic, the desire to *avoid queues* (13%) has become an important factor that drives e-commerce growth.

The growth in online shopping during 2020 has in many ways changed the logistics service industry. According to Postnord (2021) and their survey among e-retailers, 17% of the responders said they had increased their amount of delivery options during the COVID-19 pandemic, whilst none had lowered their amount of delivery options. However, the amount of customers that have been able to choose delivery methods has been increasing steadily over the past years, from 44% in 2017 to 60% in 2020 (Postnord, 2021). One major factor behind the increase in home deliveries during 2020 has been the elderly population that has been more inclined to stay at home. As an example of this, 16% growth in online shopping for Christmas presents between the ages of 60-79 was shown in 2020 (Postnord, 2021).

The pandemic has forced consumers to be more careful about choosing delivery methods and also the time windows of those deliveries in order to minimize the amount of contact with other people. This change can be seen in the preferred ways of delivery in the report from Postnord (2021). During 2019, the most preferred way of delivery amongst Swedish online shoppers was the service points, constituting 65% of all deliveries. However, the effects of the pandemic have influenced a transition towards other delivery methods according to multiple reports (Postnord, 2021; NETS, 2021; PWC, 2020).

Even though service points are still considered the main delivery destination, there has been a significant increase amongst other delivery options such as parcel lockers and home deliveries, both with and without a signature release. Compared to the results from the survey conducted in 2019, parcel lockers have increased from 5% to 12% as the preferred delivery method whilst home delivery increased from 51% to 67% (Postnord, 2020a; Postnord, 2021). Looking at Sweden's neighbouring countries, Denmark and Finland, the parcel lockers were already in 2019 a much more preferred delivery alternative with 20% in Denmark and 35% in Finland (Postnord, 2020c).

A major contributor to the favoring of home deliveries is the fact that unattended home deliveries that do not require a signature are more convenient during a pandemic like the COVID-19, due to it limiting the contact with the person delivering the parcel as previously stated. Furthermore, more last-mile logistics service providers are offering the service now than before the pandemic (Postnord, 2021).

In Table 1, the findings from the report by Postnord (2021) are shown related to the most important aspects of the deliveries according to e-commerce customers. The aspect that was regarded most important was the ability to choose the type of delivery. The second most important aspect was to receive a date for when the delivery will be made. The third most important aspect is shared between having free deliveries and free returns and the fifth most important aspect was to receive the order within 3 days.

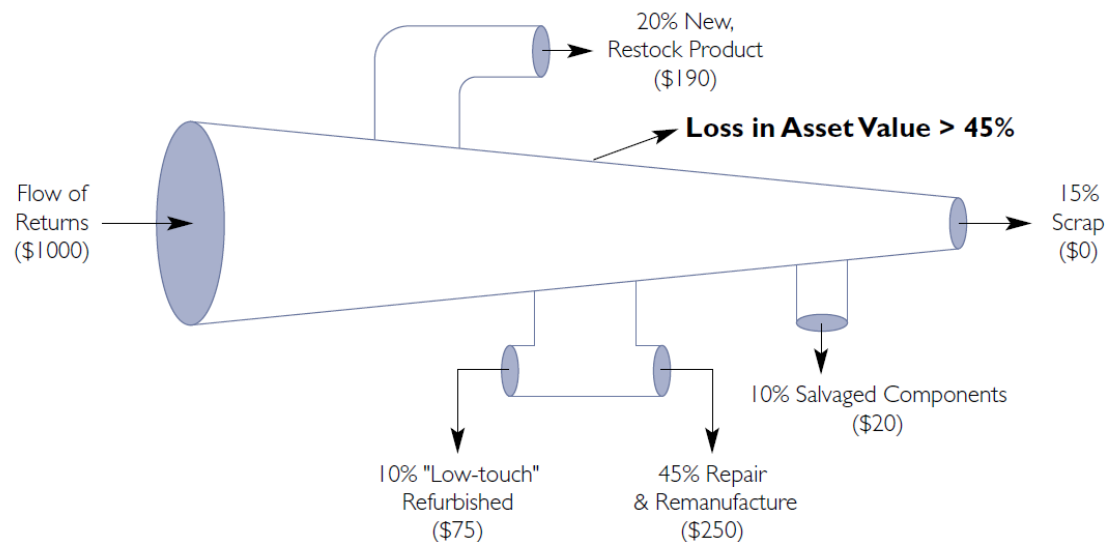
**Table 1.** Importance of different aspects of the delivery, adapted from Postnord (2021).

Delivery aspects	Share of customers stating that the aspect is important
The ability to choose how the goods will be delivered	84 %
Getting a date for when the delivery will be made	79 %
Free returns	77 %
Free delivery	77 %
Receiving the order within 3 days	65 %

### 2.1.3 E-commerce returns

Although e-commerce enables retailers to target customers that would be out of reach of traditional brick-and-mortar models, the cost of managing returns increases as the amount of returns is higher compared to face-to-face transactions (Nel and Badenhorst, 2020). A report published by Postnord (2019) showed that 12% of the Swedish respondents that had purchased a product online in the last month had returned a product. Similarly, Nel and Badenhost (2020) state that 25-30% of online purchases are returned compared to less than 10% in physical stores. With the growing amount of parcels being delivered, the amount of returns are expected to increase as well (Postnord, 2019). The reason for the high amount of returns is explained by the information imbalance, where the customer performs the purchase with limited information on product attributes compared to buying the item in a physical store (Nel and Badenhorst, 2020). Similarly, Hjort (2013) describes the reason for e-commerce returns as a result of the customer struggling to evaluate the products before ordering and that companies use generous return policies as a way to gain competitive advantage and win over hesitant customers.

The cost of product returns is shown in Figure 3 and is described by Blackburn et al. (2004) as *The shrinking pipeline*. The model describes how the value of products is lost in the processes related to returns.



**Figure 3.** *The shrinking pipeline describing the value loss of returned products (Blackburn et al., 2004)*

Blackburn et al. (2004) describe the value loss using margin value of time (MVT) which states that the speed at which an item loses value depends on what type of product it is. This creates the need for different strategies when handling returns. The two different strategies are *efficient* supply chains that prioritize low cost and *responsive* supply chains that prioritize speed of response (Blackburn et al., 2004). The speed of value loss of the returned items differ based on the type of product and industries such as electronics and fashion are considered as high clock-speed industries where items rapidly lose value. When the value loss is fast, it creates a need for responsive reverse supply chains where speed is important to quickly be able to sell the returned goods before they lose value. In the paper by Hjort (2013), the increased global competition is described as a reason for the decreased product life cycles and it is described how in some extreme cases, products are obsolete shortly after reaching the market. In less time-sensitive industries, the reverse supply chain should be designed as a cost-efficient supply chain where the time to market of the returned goods is allowed to be longer (Blackburn et al., 2004). Another aspect of reducing returns was given by Hjort (2013) who described the most cost-effective way of handling returns is through preventing measures to reduce the amount of returns before they happen.

Hjort (2013) goes on to describe one of the positive aspects of returns, explaining that returns that help recycle virgin materials are positive from a sustainability standpoint that is not only a necessary cost but a source of value creation. The increasing attention of circularity in the e-commerce sector is presented in the recent publication of *e-barometern* by Postnord (2021) where the topic of e-retailers introducing selling used items as a way both to offer vintage products, but also as an effort to be sustainable.

## 2.2 Last-mile logistics and the supply chain

This section will provide a description of the evolution of supply chain management and the different types of last-mile logistics methods. Lastly, a description of the sustainability impacts related to last-mile logistics is presented.

### 2.2.1 The evolution of supply chain management

The area of supply chain management has been under constant development and the importance of logistics solutions has evolved from being the trivial task of moving goods to become a highly valued strategic aspect of operations. The journey towards supply chain management has been ongoing for decades with the support of papers such as *Purchasing must become supply management* by Kraljic (1983), addressing the strategic importance of logistics and *issues in supply chain management* by Lambert and Cooper (2000), advocating for cross-functional integration between firms. Similarly, Hjort (2013) describes how the increased global competition forces organisations to specialize and focus on their core competencies, leaving supply chain operations to be outsourced. By forming strong relationships across the supply chain and viewing the entire chain as a unit, firms can leverage the collective capabilities to create superior competitiveness and profitability (Rice and Hoppe, 2001; Lambert and Cooper, 2000).

In managing the supply chain, Lambert and Cooper (2000) emphasise that supply chain management is not just about creating the best supply chain for the focal company, but for the entire supply chain and the customer. The need for collaboration across company borders is described as a crucial part of sustaining competitiveness, as competition is no longer between just companies, but instead between supply chains (Rice and Hoppe, 2001; Lambert and Cooper, 2000). A new actor that has emerged to connect the actors in the supply chain is the third-party logistics service providers (3PL). Besides performing the traditional logistics functions such as transportation, warehousing and inventory control, the 3PL can perform other services which facilitate the companies abilities to conduct their operations (Zacharia et al., 2011). The 3PL takes on the role to support companies in reducing inventory, sharing information and implementing the latest supply chain technology and best practices to reach the company goals (Zacharia et al., 2011). As 3PLs can serve multiple retailers, they can leverage their size to attain economies of scale and perform the logistics operations more efficiently than the individual retailers (Zacharia et al., 2011). This enables the 3PL to invest in new technology such as IT-systems and environmentally-friendly vehicles which would be too expensive for an individual retailer to purchase. By using these IT-systems and having a single 3PL managing the entire supply chain, the 3PL can provide accurate inventory in every step of the production of the goods and create transparency in the delivery by allowing both the customer and the retailer to see where the goods are and how a potential delivery is being carried out. As logistics operations are considered an asset-heavy industry and the complexity in reaching a global customer base require significant competencies, outsourcing the logistics and supply chain operations also free up resources within the organisation of the retailer that enables them to focus all of their efforts on their core operations (Zacharia et al., 2011).

The internetwork competition described by Lambert and Cooper (2000) where supply chains compete with each other include the supplier-brand-store, but in the age of e-

commerce and home deliveries, a crucial part of the chain is the last-mile delivery which in many cases is the only physical interaction with the customer (Xiao et al., 2018). The last-mile delivery comes with a range of challenges as customers demand high service quality and service options that can be personalized to create convenient ways of collecting the goods (Vakulenko et al., 2019).

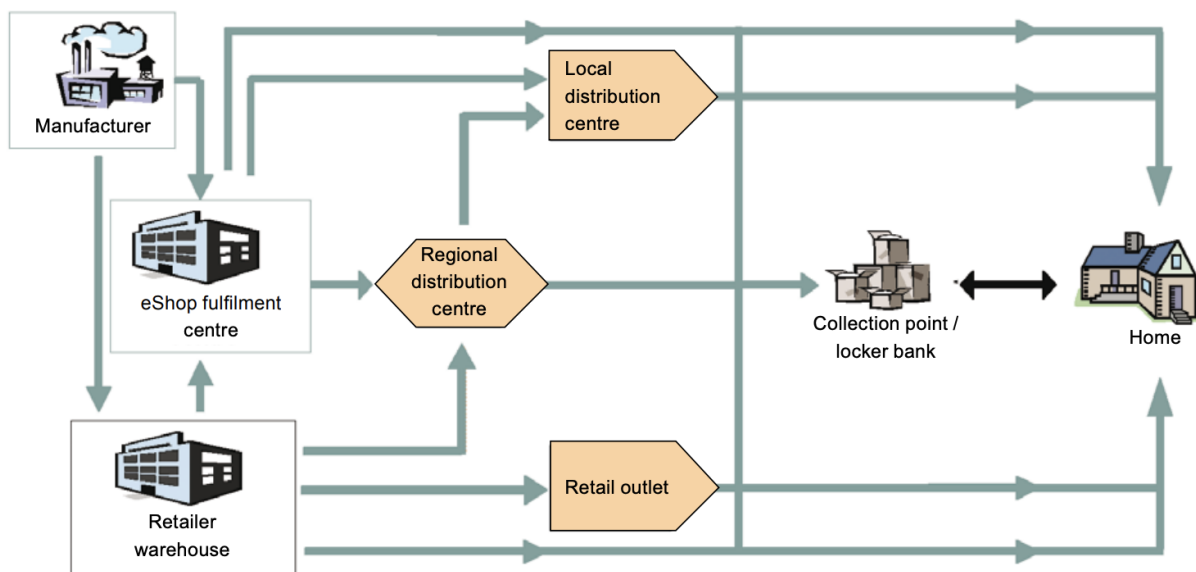
### 2.2.2 Last-mile logistics

Last-mile delivery is defined by Gevaers et al. (2011) as:

*The last-mile may be defined as the final leg in a business-to-consumer delivery service whereby the consignment is delivered to the recipient, either at the recipient's home or at a collection point. (p. 57)*

It is often described as the most complex part of the delivery and accounts for up to 50% of the total transportation costs (Xiao et al., 2018).

The Figure 4 by Allen et al. (2007) shows a common supply chain within last-mile logistics. The last-mile logistics starts from either a retail warehouse or an e-fulfillment centre. Depending on the type of logistics processes and setup of the distribution network, various supply chain conditions are deciding the method for the parcel to reach the final recipient. The parcels are transported either by own vehicles or by a (3PL) from the point of origin to a regional- or local distribution centre. Furthermore, parcels can also take the route from an e-retailer warehouse to a retail outlet store. A transshipment is usually occurring closer to the cities where the parcels are moved from larger trucks to vans due to better accessibility in urban areas. Smaller vans allow better routing due to fewer stops with less amount of parcels while facilitating high utilization levels of the vehicle. The final leg of the delivery can be made either to a collection point where service points or parcel lockers are available or directly to the end customer's home. If the delivery is made to a collection point, the customer has to travel there in order to collect their parcel.



**Figure 4.** An example of the supply chain process within last-mile logistics (Allen et al., 2007)

As the way we order goods change, the need for new types of logistics solutions increases. The strong trends of e-commerce, road congestion in urban areas and poor air quality in cities create a demand for new logistics services. Furthermore, urban last-mile logistics is often considered the most expensive and polluting part of the distribution chain whilst also being the least efficient. This is according to Gevaers et al. (2011) due to failed home deliveries, lack of mass of parcels which leaves the delivery vehicle with much unutilized space as well as the actual type of vehicle which is often smaller and hence often has higher emission per parcel.

With the growing demand for urban logistics services that result in higher volumes and more pick-up and drop-off locations, the complexity of the transportation networks becomes increasingly difficult to navigate for both e-commerce companies and LSPs (Bergmann et al., 2020). Many actors today are not combining their first-mile pickups and last-mile deliveries which most often results in lower levels of efficiency and utilization of their delivery vehicles. By consolidating the goods from the two different types of operations into one flow, multiple benefits can be reaped and can serve as a competitive advantage for both the e-retailer and the LSPs (Bergmann et al., 2018). However, adding additional stops to the routes can also cause problems as too large geographical deviations to the routes can lower the efficiency. Furthermore, factors such as load capacity, the pick-up and drop-off locations need to be optimized in a way that makes it more beneficial to combine the routes than having them separated (Xiao et al, 2018; Bergmann et al., 2018). It also needs to be cost-effective and reliable in order to meet the customer demands which are inevitably increasing due to the growing e-commerce sector.

The distribution structure of last-mile deliveries can be described by dividing it into three different categories depending on the involvement of the consumer and e-retailer; push-centric, pull-centric and hybrid (Lim et al., 2018). A push-centric structure is when the e-retailer takes full responsibility for the distribution from the warehouse to the final consignee's preferred destination point. Pull-centric is when the final consignee is responsible for the collection and transportation of the goods while the hybrid structure can be seen as a joint effort by both e-retailers and consumers, e.g. a collection point. The three most common types of delivery methods in last-mile logistics are service points, parcel lockers and home deliveries (Postnord, 2021). Parcel lockers can be divided into two separate categories depending on where it is located, either indoors at a collection point or outdoors. Home deliveries can also be divided into two separate categories, attended home deliveries where the recipient needs to receive the parcel in person and unattended home deliveries where the recipient does not have to be present at the time of delivery. A comparison between different delivery methods and their characteristics is presented in Table 2.

**Table 2:** Comparison of different delivery methods, adapted from Allen et al., (2007)

	<b>Attended Home delivery</b>	<b>Unattended Home delivery</b>	<b>Service points</b>	<b>Parcel locker at collection point</b>	<b>Parcel locker outdoors</b>
Who covers the last-mile?	Delivery company	Delivery company	Customer	Customer	Customer
Customer present?	Yes	No	No	No	No
Types of products	Any	Parcels	Parcels	Parcels	Parcels
Risk of failed deliveries	High	Virtually none	Virtually none	Virtually none	Virtually none
Delivery window	Fixed delivery hours	Fixed delivery hours	Service point opening hours	Delivery location opening hours	Delivery company operating hours
Times at which goods can be collected	Not appropriate	Not appropriate	Service points opening hours	Delivery location opening hours	Anytime
Retrieval time for customer	None	None	Short-long	Short-long	Short-long
Drop-off time	Long	Medium	Very short	Very short	Very short
Initial investment	Low	Low	Low	High	High
Delivery cost	High	Medium-high	Lowest	Lowest	Lowest
Possible operational problems	High failed deliveries, Poor use of vehicle capacity	Poor use of vehicle capacity	Customer has to travel to collect	Customer has to travel to collect	Customer has to travel to collect
Potential reduction in goods vehicle activity compared to attended delivery	-	Low	Greatest reduction	Greatest reduction	Greatest reduction



As the different delivery methods have different characteristics, the type of delivery that the customer prefers is not constant and instead depends on multiple factors. Those factors can be in the form of what is regarded as most convenient at the time of purchase, what options are available, the price of the specific delivery method, etc. Furthermore, during the COVID-19 pandemic, there has been an increased fluctuation in what delivery method that the customer prefers (Postnord, 2021). Table 3 shows the difference in customer preference between September 2020 and December 2020.

**Table 3.** Showing the share of e-commerce customers that prefer a certain delivery option in September 2020 and December 2020. Own visualization based on Postnord (2021).

Delivery Method	September 2020	December 2020
Service point	36%	26%
Parcel locker	9%	12%
Attended home delivery	13%	15%
Unattended home delivery	45%	52%
Pick up in physical store	1%	1%

#### 2.2.2.1 Service points

The most widely used delivery solution in Sweden is service points (Postnord, 2020c). The service point is a manned pick-up and drop-off point most often located in conveniently placed stores that combine e-commerce deliveries with everyday food and groceries. There are multiple benefits with using service points instead of home deliveries, both from the LSPs and customers' perspectives (Yuen et al., 2018). For the LSPs, the order fulfillment is improved in comparison to home deliveries as it eliminates the failed deliveries that are linked with home deliveries. This can result in substantial cost savings for the LSPs as failed deliveries result in substantial costs. Furthermore, the societal and environmental impacts of consolidating more parcels and hence reducing the need for more road trips is another factor that Yuen et al. (2018) bring forth as benefits of service points. From the customer perspective, the convenience of not having to wait for the delivery at home but instead deciding when to pick up the parcel is a beneficial factor for service points in comparison to home deliveries. In January 2020, there were more than 5000 service points spread throughout Sweden which offer deliveries from the different logistics companies (PTS, 2020). The service points have been a popular choice among Swedish consumers but as home deliveries and the use of parcel lockers has increased, the market share of the service points have decreased (Postnord, 2021). As service points are often associated with crowded spaces and long queues, a company called *Leveriet* started a new type of service point that offers a better customer experience (Allhorn, 2019). At *Leveriet*, the customer can open their parcel and try on the clothes they have bought and dispose of the packages if they are satisfied or return the items. The services also

include sending parcels as customers can wrap gifts and pack them for delivery (Allhorn, 2019).

#### **2.2.2.2 Home deliveries**

One of the fastest growing delivery solutions are home deliveries where the LSP transports the parcel to the recipient's home (Postnord, 2021, Postnord, 2020a). Home deliveries are regarded as a push-centric delivery method according to the categorisation by Lim et al. (2018). Home delivery is however not a new thing that is only related to e-commerce, as it has been used before the internet-era with mail order companies but also by retailers to help transport larger goods such as furniture and larger electric appliances (Visser et al., 2014). The four categories of home shopping mentioned previously in Section 2.1. were predominately using home deliveries as the delivery method (Laghaei et al., 2015).

In the study *e-barometern* which is conducted yearly by Postnord, the Swedish consumers are surveyed on their delivery preferences, and in 2019, 13% preferred attended delivered home and 38% preferred unattended home deliveries. One year later in 2020, these numbers had increased to 15% for attended and 52% for unattended home deliveries (Postnord, 2020a; Postnord, 2021). The large increase of home deliveries has created a drop in the interest of pick-up points which have decreased from 38% in 2019 to 26% in 2020 (Postnord, 2020a, Postnord 2021).

Ever since the start of home deliveries, there have been issues raised by the different actors related, including customers and LSPs (Visser et al., 2014). From the consumer perspective, issues such as delivery not on-time, delivery charge too high, not at home or even forced to stay at home are the dominant factors. For the LSPs, issues related to additional costs at failed first-attempt deliveries are being presented. The increased number of alternatives in terms of choice of time and date of delivery can help reduce the risk of failed deliveries, and with the help of ICT-technology that facilitates more accurate information from the LSPs on the time of delivery, the risks are even more reduced. However, Visser et al. (2014) state that the LSPs are not that eager to implement such technology.

For the retailers, e-commerce allows them to sell their products without geographical limitations, reduce costs by replacing expensive store rents in urban areas with websites and better marketing possibilities (Allen et al., 2007).

Park and Regan (2004) bring forth the “not at home” problem where the receiver of the goods is not present at the time of delivery as the main issue. One of the reasons why the home delivery option has gained in popularity during 2020 is the increased amount of people working from home, which makes them available to receive the goods (Postnord, 2021).

As the pandemic is believed to subside and the amount of time spent working from home decreases, the need for other solutions to make home deliveries more viable will continue to increase. The main solutions to increase the efficiency of home deliveries are unattended deliveries where the goods are left at the location of the receiver without the need for a signature (Xu et al., 2008). The solutions do have questionable security aspects as the goods are at risk of being stolen, but measures are being taken to leave the goods in a “safe place” such as behind the house (DHL, 2021). Another way to perform the home deliveries is to deliver the goods in the evening when the

receiver is home from work. These deliveries increase the convenience for the receiver, but also increase delivery efficiency as the streets are less congested in the evening and fewer deliveries fail (Fridh, 2017). As some customers do not want their deliveries left unattended, or when delivering sensitive products such as medication which need to be received, the home deliveries can be combined with the use of parcel lockers to be able to have a convenient solution to the “not at home” problem. In these cases, the failed home delivery can be left at the closest parcel locker where the receiver can pick up the delivery at a more suitable time (de Oliveira, 2017).

### **2.2.2.3 Parcel lockers**

One of the growing alternatives for last-mile deliveries is the use of automated parcel locker stations that provide consumers the ability to collect the parcel at their own convenience and location (Wang et al., 2019). The parcel lockers are regarded as a hybrid structured delivery method as the recipient needs to transport their parcel from the locker to their home (Lim et al., 2018). The advantages of having accessible automated delivery solutions such as parcel lockers increase both customer satisfaction and the delivery efficiency (de Oliveira et al., 2017). The usage of parcel lockers in Sweden is low compared to other European countries which according to PTS (2020) is because the consumers have been satisfied with the service points. As the volumes are increasing, creating long queue times at peak hours, the interest in parcel lockers has risen significantly over the last few years (PTS, 2020). When using the parcel lockers for delivery, the consumer gets a notification by e-mail or SMS to their mobile phone with a password when their parcel is ready for pick up. Depending on the type of parcel locker, to receive the parcel, the customer opens the locker by either entering this password in the parcel locker station interface or by using a Bluetooth digital key. As stated by Wang et al. (2019), parcel lockers facilitate the consolidation of parcels for the logistics service provider and counteract issues such as failed home deliveries and low fill-rate in delivery trucks, whilst making the logistics operations more efficient in terms of time schedules and decreasing the environmental impact of the delivery. In a study conducted by Joerss et al. (2016) the customer willingness to pay regarding different delivery solutions was investigated. The findings showed that although the parcel lockers provide the customers with a delivery that is accessible 24/7, the price of a home delivery would have to be 3 Euros higher than the price to use a parcel locker to convince 50% of the respondents to choose the parcel lockers. Although the home deliveries were often valued higher by the respondents in the study, to have the option to choose the parcel lockers at times when it is more convenient was found to bring significant value to customer satisfaction (Joerss et al., 2016)

### **2.2.3 Environmental sustainability in last-mile logistics**

The last mile of e-commerce deliveries is the most emissions-intensive part of the delivery (Slabinac, 2015; Joerss et al., 2016; Gevaers et al., 2011). As e-commerce growth accelerates, the question of sustainability becomes increasingly important. To investigate the sustainability impacts of e-commerce deliveries, this section will provide a description of how the increased transportation need affects the triple bottom line. The triple bottom line is divided into three parts consisting of environmental, social and economic sustainability.

To manage the increasing demand for last-mile logistics solutions in e-commerce deliveries, the number of heavy trucks increases. In a study presented in 2020 before the pandemic by the World Economic Forum (2020), the projected increase of delivery vehicles was 36% until 2030 resulting in a 32% increase of emissions and an average of 11 minutes longer commute time in the 100 largest cities in the world because of increased congestion. As Postnord (2021) presented the results of the Swedish market for 2020, the increase in e-commerce achieved 40%, which is higher than the projected 10-year development worldwide. On the other hand, the number of passenger cars that would have been used to drive to a physical store decreases as e-commerce substitutes the need to shop in person. Visser et al. (2014) further discuss the topic by saying that the situation is more complex than that, as customers might still go shopping in traditional stores but instead just buy less there, while still emitting the same amount of carbon from their car while adding that of the delivery truck. However, they still emphasize the fact that e-commerce leads to the bundling of goods into one delivery route and hence allows more deliveries per route resulting in higher efficiency. In a simulation study conducted by Jaller and Pahwa (2020), it was found that the vehicle meters traveled (VMT) significantly decreased as e-commerce substituted physical shopping. The reason for this is the consolidation of the delivery vehicles which increase the efficiency of the transportation. A disadvantage of using heavy trucks is the high NOx emissions compared to passenger cars (Jaller and Pahwa, 2020). The authors describe that the VMT could decrease by around 7.2% to 87.6% but at the same time, the NOx emissions could increase up to 24%.

To decrease the emissions the introduction of emission-free transport modes such as electric trucks and light electric freight vehicles (LEFV) could be used (Jaller and Pahwa, 2020). Furthermore, Ignat and Chankov (2020) advise influencing consumers to adopt more sustainable behaviours towards how they shop online such as accepting longer delivery times (Ingat and Hankov, 2020). Other aspects of environmentally harmful customer behaviour are the excessive orders of items that result in high amounts of returns (Cullinane et al., 2019).

Oliviera et al. (2019) suggest using service points instead of home deliveries to allow for logistics service providers to make larger consolidated deliveries to one single location where the consumer can walk to pick up their parcel. Similarly, Kjellsdotter Ivert et al. (2020) described how consolidated deliveries to service points are more sustainable if the customer does not use a passenger car to drive to the service point.

A large financial challenge for logistics service providers is the need to invest in new, environmentally sustainable vehicles. Veldman (2019) suggests that even though investing in new vehicles such as LEFV for last-mile delivery is expensive, it can result in long-term cost savings as the cost of charging the vehicles is low.

In a survey conducted by Postnord (2020b), a question regarding the consumers' willingness to pay for sustainable deliveries was included. The question asked if the consumers would be willing to pay 5 SEK extra to get a sustainable delivery. It was found that 78 % of the consumers would choose the sustainable delivery option at the higher price (Postnord, 2020b).

## **2.3 Understanding value creation**

This section provides a description of two concepts used to understand the value creation of the logistics actors. The customer experience and customer journey is used to describe the points in the customer interaction that the customer experiences. The service-dominant logic is used to elaborate on the abstract value creation of the logistic services.

### **2.3.1 Customer experience and customer journey**

With the surge of e-commerce, the customer experience has been transformed compared to traditional channels. Since e-commerce generally includes more actors than traditional channels, the holistic view has gained more importance and all the touchpoints within the customer journey can influence the overall experience (Vakulenko et al., 2019). Hence, creating a seamless customer journey is of utmost importance in order to gain customer trust and to ensure that you offer high customer satisfaction levels (Tax, McCutcheon, & Wilkinson, 2013). Two factors that greatly influence if a last-mile delivery is deemed successful are according to Vakulenko et al. (2019); changes in customer behavior and changes in customer experience. These two changes are a result of the innovation that drives both the last-mile delivery sector as well as the e-commerce sector and hence needs to be dissected by the operating actors in order to stay competitive and gain customer satisfaction. The correlation between overall customer satisfaction and customer loyalty is explored by Subhashini and Hemamalini (2016) who describe how e-commerce businesses can increase their profit by applying a holistic perspective of customer experience to create loyal, recurring customers. The authors continue to describe how satisfied customers are likely to share their positive experiences which attract new customers. Another reason to invest in sustaining the customer base is described by Gallo (2014) who presented that gaining a new customer is much more costly than keeping an existing one. Depending on the industry, the cost of gaining a new customer can range from 5-25 times more expensive than the cost of sustaining a customer. The founder of net promoter score (NPS) argues that increasing the amount of retained customers by 5% can increase the profitability by 25% (Reichheld, 2001).

In a paper by Fanderl, Neher and Pulodo (2016) the importance of working with customer feedback and the barriers companies are facing when using customer feedback is described. The paper describes that the most important aspect of gathering and using customer feedback is not what kind of measurement the company uses, but the way they are using it. What matters most is that the metrics are collected, analyzed and acted on systematically and consciously (Fanderl, Neher and Pulodo, 2016). Birch-Jensen (2018) describes how servitization and digitalization as customer requirements become more complex and that customer preferences are changing at an increasing rate.

Throughout the customer journey, multiple interactions take place between the company and the customer called touchpoints. All of these touchpoints will shape and mold the experience that a customer has along the customer journey. Touchpoints can be seen as points of interactions between the customer and the company that both individually and collectively influence the customer experience. Lemon and Verhoef (2016) have brought forward a model that identifies four categories of different customer touchpoints. The impact that each category has on the customer journey can

differ depending on the type of product or service and also from customer to customer. The model can be used by companies to distinguish between those touchpoints they can influence and those they cannot. The four categories of touchpoints are: Brand-owned, partner-owned, customer-owned and social and external.

The brand-owned touchpoints are well studied in literature and are often the focus of internal marketing departments (Lemon & Verhoef, 2016). This can be through direct marketing, loyalty programs, website attributes but also through other elements such as pricing, packaging and service. The brand-owned touchpoints are all under the control of the company and hence are easier to manage and influence. According to Hallikainen, Alamäki and Laukkanen (2019), these are the digital touchpoints that the customer prefers and hence play an important role in the journey.

Customer interactions that are jointly managed or designed by the company and its partners can be very influential when it comes to the success of the customer journey. These interactions are called partner-owned touchpoints and can be in the form of the distribution of goods, marketing through external agencies and communication channels. The effects of such touchpoints can be just as crucial as the brand-owned and require substantial efforts in order to create a seamless experience for the customer. Furthermore, Lemon and Verhoef (2016) explain the difficulty of separating brand-owned and partner-owned at times due to the coherence some of the touchpoints can have. An example given is the brand-owned app that can require updates due to the Google Android and Apple iOS platforms being updated, hence being influenced by their partners. Furthermore, mobile applications used by customers but provided by a partner e.g. a delivery tracking application, can have a large impact on the delivery experience and hence the overall customer experience.

Customer-owned touchpoints are the type of touchpoints that neither the company nor their partners control or influence. They can be located in the pre-purchase stage, during the purchase or in the post-purchase stage (Lemon & Verhoef, 2016). An example of a pre-purchase touchpoint can be when the customers are considering their needs and desires, whilst during the purchase, one touchpoint could be the choice of payment. However, as with most touchpoints, the choice of payment is often intertwined with a partner which makes the categorization of touchpoints more of a general classification than it is in reality. The intertwined nature of touchpoints together forms the complexity of the customer experience (Vakulenko et al., 2019). The customer-owned touchpoints have been predominantly situated post-purchase as that is when the product or service is used by the customer, but they occur like previously stated in all stages. With new types of interactions taking place all over the customer journey compared to just a few decades ago, the value co-creation described in the following SD-logic chapter is becoming a larger part of the customer journey (Vargo & Lusch, 2004).

Throughout the customer journey, there are social and external touchpoints that may influence the experience. This is where other customers' or companies' actions influence the customer journey. Such touchpoints can for example be other customers who in one way or another, either solicited or unsolicited, can affect the customer through all three stages (Lemon & Verhoef, 2016). Social media is a large contributor to the social touchpoints and has been an area of focus in terms of investments from companies over the past decade. According to Hallikainen et al. (2019), social

touchpoints may be most beneficial when it comes to creating interest and raising awareness of a company or a product. Furthermore, the effects of social touchpoints can be even larger than of traditional advertising (Baxendale et al., 2015). Another example of an external touchpoint can be in the form of review sites, e.g. Pricerunner, that can influence the decision of a customer and hence also the customer journey.

### **2.3.2 Service-dominant logic**

The service-dominant logic (S-D logic) was developed by Vargo and Lusch (2004) as a concept to describe how value is co-created by the service provider and the end customer at the point of interaction. The theory is an adaptation of the goods-dominant logic which describes value in the form of physical attributes and tangible characteristics of goods. As the service-dominant theory was developed, the intangible aspect of value was viewed as increasingly important to describe perceived value by the end customer (Vargo and Lusch, 2004). Service-dominant logic according to Vargo and Lusch is about bundling core competencies to create valuable offerings and include integration of business disciplines and working across organizational boundaries.

The origin of S-D logic is based on marketing, but in a paper by Yazdanparast et al. (2010), a detailed description of why S-D logic is applicable to the co-creation of logistics value was presented. Yazdanparast et al. (2010) describe why S-D logic is a powerful framework for analysing logistics value creation based on four key aspects. The first aspect connects how in S-D logic, the service is regarded as a fundamental basis of exchange which can be seen in the e-commerce sector where the logistics services are critical to the operations of the business. The second aspect is the impact of logistics services on the value perceived by the customer. The authors described how the delivery service impacts not only the customer experience at the point of delivery but also the value of the goods delivered. The third aspect describes how the value in logistics services is co-created by the involvement of the customer in choosing what type of delivery is the most valuable in the specific delivery context. This interactive process calls for collaboration between the logistics service provider and the end customer to create the most efficient service to suit the customer's needs. Yazdanparast et al. (2010) go on to describe how logistics is often outsourced, the fourth and final aspect explains the importance of the company outsourcing the logistics services maintaining close collaboration with the logistics service providers to not lose touch with the end customer as the value is decided based on the perceived value of the customer.

As e-commerce creates a shopping environment where the same product is available at a similar price from several vendors, the switching costs are low and to create a satisfactory customer experience all aspects of the customer experience become crucial in order to have returning customers (Khan, 2016). Contrary to the goods-dominant logic where standardized goods are produced with no involvement with the customer, the service-dominant perspective involves the customer in co-creating value. In last-mile logistics services, this can be seen in services where the customer can change the delivery time and the type of delivery until the point the goods are left at the destination (Yazdanparast et al., 2010). This gives the logistics operator a key

role in creating a service that customers enjoy and create a competitive market offering for the retailer.

According to Yazdanparast et al. (2010), there are challenges that the logistics service providers are struggling with in order to fulfill the customer's desires. Logistics managers are having a hard time identifying the value-adding aspects of their services from the customer perspective. Furthermore, the authors describe how the value created is based on the customers' perceptions of the gap between the service provided and the service received. This results in that as the gap becomes smaller, the value increases. The challenging aspect of creating value through service offerings that the customer wants in a cost-effective manner is further emphasized by the authors. Balancing the value against costs in a sector that is characterized by low margins can be difficult. Lastly, Yazdanparast et al. (2010) describe the challenge of updating the service offerings proactively and in a continuous manner so that the customers' ever-changing demand and drivers are met. The involvement of customers can help the logistics service providers overcome the challenges described and bring additional value to the services.



### **3. Research methodology**

The methodology chapter presents the strategy and design of the research that has been conducted in order to be able to answer the research questions as well as to fulfill the purpose of the study. According to Denscombe (2014), there is a clear distinction between research strategy and research design that needs to be addressed. Research strategy is referred to as the overall plan on how the research will be conducted whilst research design describes how the collection of data will be performed and analyzed.

---

#### **3.1 Research strategy**

When choosing what type of research strategy that is best suited for a specific type of research, several factors are important to consider. Will the collection of data and theories be of a quantitative or qualitative nature and hence, will the relationship between theory and research be emphasized from a deductive, inductive, or abductive approach. In order to fulfill the aim of the report, a mixed approach where the majority of the data collected has been of qualitative nature with some quantitative data in the forms of statistics from published reports has been used.

The deductive approach starts from theory and hypotheses that are tested and evaluated against empirical findings, whilst the inductive approach originates from the empirical data and findings which are then being tested against theories and hypotheses (Bryman & Bell, 2015). In order to gain deeper knowledge and understanding of the importance of the various aspects in the e-commerce value chain, the approach used in this study has been inductive. Björklund and Paulsson (2014) describe the reasoning behind choosing the appropriate approach should be the alternative that gives the greatest fulfillment of the aim with regards to the resources available.

#### **3.2 Research design**

It is crucial to choose an appropriate research method in order to facilitate the process of answering the research questions. A widely used approach in business research is cross-sectional studies, which allows the researcher to gain in-depth knowledge from a variety of respondents (Bryman & Bell, 2015; Denscombe, 2014). The cross-sectional design has been used as the report investigates the relationship and dynamics of a specific context with multiple different actors involved in the last-mile logistics domain. Conducting a cross-sectional study allowed the report to distinguish the relationships between different variables and perspectives related to the value added by last-mile delivery solutions and the customer interactions. Cross-sectional studies are empirical studies that not only focus on what occurs in a specific situation or point in time but also on the variables behind those events. Hence, cross-sectional studies allow the researcher to go into details on complex dynamics and relationships from different perspectives within a setting and thus provides a holistic view of the affecting parts (Denscombe, 2014).

The approach is suitable for this report as there are several parameters and interconnected relationships and processes that influence the investigated setting which requires a holistic view.

Conducting research with a cross-sectional design allows and encourages both qualitative and quantitative data to be used as well as different methods of gathering data such as interviews, observations, documents and questionnaires (Denscombe, 2014; Bryman & Bell, 2015; Saunders et al., 2016). Depending on what type of relationship or setting that is to be investigated, the researcher can choose the most appropriate methods.

### **3.3 Literature Review**

The study was initiated by conducting a broad literature review on different topics associated with last-mile logistics and the value of different last-mile logistics activities. In order to understand the last-mile logistics sector and the drivers behind its development, the literature review investigates the history of e-commerce and the technological advancements that have been made since its birth. This was made to get an understanding of the ongoing trends and how such trends will influence the forthcoming advancements. The literature review starts by explaining the e-commerce market, the trends that can be seen in Sweden, and the returns of e-commerce products. This is followed by a description of the evolution of supply chain management which leads into the last-mile logistics. Lastly, the concept of service-dominant logic is described.

The literature was found through EBSCOhost, Google Scholar, and articles recommended by our supervisor at VTI and by the interviewees. By reviewing the literature, a literature review could be built on relevant topics to the area of study. Furthermore, reports and studies from organisations and authorities such as Konkurrensverket, Post- och Telestyrelsen, the European Commission, and the United Nations were used as sources of information and statistics for the literature review.

Keywords were determined at the start of the literature review in order to find relevant literature to the scope of the report. Examples of keywords used are: last-mile deliveries, e-commerce development, logistics innovations, interface, customer journey, and sustainability.

### **3.4 Interviews**

There are several different designs of research interviews and they form an important part of data collection. In qualitative research, there are several interview forms that are better suited than others for collecting information such as semi-structured, unstructured, and focused interviews. Semi-structured interviews use a set of questions whose order may vary depending on the interviewees' answers and leaves room for relevant follow-up questions to further delve into an area. Unstructured interviews consist of questions that are more open in general which opens up for discussion (Bryman & Bell, 2015).

When information regarding a specific event or setting is sought, focused interviews are used that consist of open-ended questions where follow-up questions can be asked for a more detailed explanation of the event (Bryman & Bell, 2015).

As this research was focusing on a specific setting, namely the last-mile logistics of e-commerce, it was concluded that a mix of focused- and semi-structured interviews were the best fit for the area of investigation.

Qualitative interviews were conducted to establish an understanding of the last-mile logistics environment and the contextual factors that influence its development. In order to gain a holistic view of the area of research, different stakeholders within the last-mile logistics sector in the form of logistics service providers and logistics solution providers were chosen for the interviews. Further interviews were carried out with consulting- and research firms related to the e-commerce and customer journey sectors in order to get a deeper understanding of how those areas are connected but also to get a different perspective on the last-mile logistics sector. All interviews were held remotely through the use of the video conferencing services Zoom and Teams.

When sampling the type of companies and roles of the interviewees, snowball sampling where a small group of companies and people are chosen based on their relevance to the research topic, who then proposes other persons relevant to the research have been used. The LSP companies that were chosen for the interviews were based on different factors such as their involvement in last-mile delivery, the type of logistics services they provide, and the size of the company. These factors and the engagement of the different companies is presented in Figure 5. In order to get a holistic view of the last-mile logistics sector, the aim was to interview both large and small logistics service providers and especially the companies that have recently established themselves in this sector. These criteria were made to get different perspectives on the research topic. However, the ongoing pandemic and the pressure that this has put on the sector, and especially on the newer companies that are growing rapidly, made it difficult to find potential interviewees that were available for an interview. Hence, the sampling for the interviews became smaller than initially intended. The research- and consulting firms were sampled to get a nuanced and unbiased view of the e-commerce and last-mile logistics sector as they are not directly tied to the last-mile logistics activities.

Company	A	B	C	D	E	F	G	H	I	J
LSP	✓	✓	✓	✓						
Home deliveries	✓	✓	✓	✓						
Parcel lockers	✓		✓		✓	✓				
Service point	✓		✓	✓						
IT-solutions	✓	✓	✓	✓		✓	✓			
Consulting								✓	✓	✓

**Figure 5.** *Showing the type of services provided by the interviewed companies.*

Both Jacobsen (2002) and Bryman and Bell (2015) put great emphasis on clarifying to the respondent the purpose of the interview, why it is important and what type of information is collected. This allows for more precise answers regarding the topic of the research conducted. Hence, we explained the scope and purpose of our report at the start of the interviews. Allowing the respondent to ask questions back is important and helps create a trusting relationship and facilitates getting relevant answers (Bryman & Bell, 2015; Bell, 2006). It is also important that the respondent is given the opportunity to ask questions as this creates an environment where the interviewee can

think and share his or her experiences. This was emphasized in all of the interviews and helped the process of acquiring additional information that proved to be relevant for the scope of the report.

### **3.5 Descriptions of the interviewed companies**

In the following section, the interviewed companies will be described. The type of company, where they operate and the size will be described. Furthermore, the interviewee of each company will be described to give context to the provided answers to the interview questions. The interviewed companies have been anonymized as a majority of the interviewees have prominent roles within the company which would make it apparent who the interviewee is. The type of company, the role of the interviewee, their given abbreviation, the industry they operate in, and date of the interview is presented in Table 4.

#### **3.5.1 Logistics Service Providers**

##### *Company A (LSP1)*

Company A is a Nordic logistics service provider operating in Sweden and Denmark. The company is owned jointly by the two states and offers multiple services within both the B2B- and B2C-sector. They are a market leader in the Nordic region and during 2020 they shipped a total of 200 million parcels to consumers while having a total net sales of nearly 40 billion SEK. Interviewee A (LSP1a) is working as an e-commerce advisor and has long experience in the logistics sector. Interviewee B (LSP1b) is working as Chief of Staff in Innovation, primarily focusing on the innovation strategies within their production on a horizon of three years.

##### *Company B (LSP2)*

Company B is a Swedish logistics service provider with operations in Sweden, Norway, and Denmark with 125 employees. The company vision is to “Become the preferred customer choice in last-mile and express services within Northern Europe based on honest sustainable performance”. The fastest-growing business area for the company is e-commerce home deliveries and large efforts are put on creating it-solutions related to last-mile delivery.

The interviewee (LSP2) has more than 15 years of experience in the logistics industry specializing in e-commerce and currently works as Head of B2C at Company B.

##### *Company C (LSP3)*

Company C is a global logistics service provider operating in over 200 countries and with more than 300 000 employees worldwide. They have a wide service offering of solutions regarding mail, packages, and information. The company consists of six different subsidiaries that focus on different parts of the supply chain where our interviewee is working within the section focusing on international and express deliveries of goods. The interviewee (LSP3) has a history as a senior project manager and currently works as Head of Products and was in charge of the first introduction of parcel lockers in Sweden in 2014.

#### *Company D (LSP4)*

LSP4 is a large global logistics service provider with 75 000 employees worldwide, and 3500 employees in Sweden. The services offered by the company range from business-to-business deliveries and the business-to-consumer market which means that they are affected by the e-commerce development within 3PL services, warehousing, transportation, and last-mile delivery. The company provides e-commerce customers with home deliveries and has 1600 service points all over the country. Two interviews were conducted at Company D and the first interviewee (LSP4a) has 13 years of experience in the logistics industry working with business development, 3PL, solutions design, and transportation. The interviewee has worked for Company D for 11 years and currently has the position of Business Development Manager. The second interviewee (LSP4b) has worked for Company D for 8 years and currently works as Head of Business Development and Solutions Design. He has 25 years of experience in the logistics industry working with Warehousing, Transportation, intermodal terminals and courier transports.

### **3.5.2 Logistic Solutions companies (LS)**

#### *Company E (LS1)*

Company E is a German manufacturing company producing post and parcel lockers for apartment buildings. The Swedish subsidiary manages the Swedish market and develops the technology used in the lockers. The company has 900 employees and has a turnover of over one billion SEK and controls 40% of the European market of parcel and postal lockers. The interviewee (LS1) is the CEO of the Swedish subsidiary of Company E and was previously Head of Business Development.

#### *Company F (LS2)*

Company F is a small company started in 2020 with ambitious aspirations to place 50 000 parcel lockers all over Sweden within five years. The aim is to provide city dwellers with parcel lockers that are always within 300 meters. The lockers are battery-powered and constructed to be placed outside which enables the users 24-hour availability to deliver, and collect parcels. The company is owned by the founders and two large real estate companies as a way to provide lockers that are available for all logistics service providers and create convenient parcel deliveries for the residents. The interviewee (LS2) has 25 years of experience in marketing and communication and has previously worked as head of public relations and communications at a large Nordic logistics company. LS2 recently founded Company F and holds the position of Chief Operating Officer (COO) and Chief Marketing Officer (CMO).

#### *Company G (LS3)*

Company G is a small IT-company specializing in digital locks used for unsupervised deliveries in the construction industry and for parcel lockers. The company was started in 2012 and has 8 employees working with creating an interface between logistics service providers and end-users enabling unattended deliveries. The company recently started a joint venture with Company F to develop software for the digital keys used in the parcel lockers offered by Company F. They provide the parcel locker manufacturers with the technology used to provide safe, and easy-to-use lockers. Depending on the customer of the software, Company G can provide the entire interface, or only the digital locks when the customer wants to have full control over how the application is designed. The interviewee (LS3) has experience in working with

business development and project management and is the co-founder and CEO of the company.

### 3.5.3 Research and consulting companies

#### *Company H (BGC)*

The business growth consultancy (BGC) company is a Swedish company with 26 employees. They specialize in mapping and improving the customer experience for their customers in various industries. The company has worked with several of the established e-commerce actors in Sweden where they have helped increase customer satisfaction on their platforms.

The interviewee (BGC) has previously been a senior manager at several management consultant companies in the last 20 years and became a partner at the current company in 2015.

#### *Company I (CR)*

The commerce research (CR) company has researched the Swedish market for the last 50 years. Today they have 30 employees with deep knowledge of the Swedish retail and e-commerce market and conduct research for companies and municipalities on Swedish trends and consumer behaviour in those areas.

The interviewee (CR) works as a Retail Analyst at Company I and has been project manager of several reports on Swedish retail.

#### *Company J (LC)*

Company J is an independent logistics consultant company owned by a large international logistics company. They help their customers with supply chain transformations and create efficient logistic solutions. The company was started in the year 2000 and has 20 employees.

The interviewee (LC) is the CEO of the company since 2015 and is a board member of a research organisation working with transport efficiency.

**Table 4:** *Description of interviewed companies, abbreviation of the interviewee, type of actor, role of the interviewee, and the date of the interview.*

COMPANY	INTERVIEWEE	INDUSTRY	ROLE	DATE
Company A	LSP1a	Nordic logistics service provider	E-commerce advisor	2021-03-04
	LSP1b	Nordic logistics service provider	Chief of Staff in Innovation	2021-03-10
Company B	LSP2	Nordic logistics service provider	Head of B2C	2021-03-05
Company C	LSP3	Global logistics service provider	Head of Products	2021-03-10

Company D	LSP4a	Global logistics service provider	Business Development Manager	2021-02-25
	LSP4b	Global logistics service provider	Head of Business Development and Solutions Design	2021-03-11
Company E	LS1	Logistic solutions	Chief Executive Officer	2021-03-05
Company F	LS2	Logistic solutions	Chief Operating Officer and Chief Marketing Officer	2021-03-03
Company G	LS3	Logistic solutions	Chief Executive Officer	2021-03-19
Company H	BGC	Business growth consulting	Partner	2021-03-04
Company I	CR	Commerce researching	Retail Analyst	2021-03-11
Company J	LC	Logistics consulting	Chief Executive Officer	2021-03-18

### 3.6 Data analysis

To understand and explicate the meaning of the data collected through the interviews, the data was structured and analyzed using the thematic approach suggested by Bryman and Bell (2015). When constructing the qualitative data from the interview into central themes and subthemes, the transcripts were thoroughly analysed where recurring patterns of data were interpreted and grouped into themes. The chosen thematic method was used with an abductive approach, where the development of themes from the empirical findings may have been influenced by the studied research in the literature review.

The central themes and subthemes were identified as *e-commerce growth and the implications on last-mile delivery* (e-commerce development, last-mile logistics development, delivery options and returns, sustainability), *customer interaction in last-mile delivery* (customer feedback, customer interaction and interface).

### 3.7 Reflection about chosen methodology

The report is built on the cross-sectional study in the form of interviews that has been tested against the literature in order to provide answers to the research questions. The approach has been an iterative process which has had consequences on the result of the thesis.

The literature study was performed to get familiar with the topics related to the research objective and to build a foundation for the interviews. However, as the COVID-19 pandemic has increased the demand for last-mile logistics activities and hence, the companies related to the sector have had increased workloads during the time of the study, the companies available for interviews was restricted. Initially, the plan was to investigate the drive behind the innovation caused by the pandemic and the newly established last-mile logistics companies but those companies were either difficult to reach or unable to take part in an interview. As a result, the research aim shifted towards evaluating the value of existing last-mile solutions provided by actors that were predominantly well-established actors in the sector.

The research strategy shifted during the thesis process, from a deductive approach to a more inductive approach, as the empirical findings provided new insights and interesting directions. Additionally, the research questions have been adjusted during the process.

Occasionally, the interviewees did not have a role within the company that was completely connected to subjects related to the objective of the research. This often became apparent during the interviews and as previously discussed, the ongoing pandemic and limited time of the study made it hard to find an additional interviewee at the companies. This most likely influenced the empirical findings and resulted in some perspectives missing. Furthermore, the questionnaire that was used during the interviews developed during the interview phase of the thesis as the interviewers discovered new topics that became interesting and also due to the fact that some questions were not as relevant if the interviewee did not possess the knowledge to provide a contributing answer.

Due to the ongoing pandemic and its effects on travel restrictions and social distancing, all interviews had to be conducted remotely. This might have influenced the interviews as it creates a different environment compared to conducting the interviews in person.



However, having remote interviews allowed for more freedom of choice in terms of companies, as it did not imply any geographical limitations.

## 4. Empirical Findings

The following chapter presents the findings from the interviews. The sections are divided into subject areas where the answers from the interviewees are provided. The findings are structured to match the topics of the reports' two research questions.

---

### 4.1 E-commerce growth and the implications on last-mile delivery

When discussing the innovation and development of the last-mile delivery sector as a result of the increasing adoption of e-commerce shopping among customers, the CR explained their view on how the sector might change once the COVID-19 pandemic is over. They see that the demand for traditional shopping in physical stores is still present and that customers will most likely go back to shopping malls where they can buy a variety of products at the same location. This trend can, according to the CR, be seen in countries such as Israel and Australia that have started to lift their restrictions and where especially Israel has come a long way in its vaccine program. They continue their projection of the e-commerce landscape by bringing up the fact that many new customers have been introduced to e-commerce as a result of the COVID-19 restrictions. They are of the firm belief that once a new customer has tried e-commerce once, they are likely to come back. This statement is backed by the majority of the interviewed companies, where they are saying that customers are creating new online habits and finding it more convenient to shop online compared to traditional stores. The BGC believes that e-commerce will continue to gain market shares but that a balance will eventually be met, where the retailers will need to choose what type of goods they should prioritize and promote in the different channels. The majority of the interviewed companies believe that the market will reach a maturity level where both traditional shops and e-retailers will live in symbiosis.

Another interesting aspect that was brought up by the LSP2 interviewee was that there is a possibility that brick and mortar-stores will use their store area for storing products that are sold to e-consumers in a mix-channel approach. Furthermore, LSP4a argues that just like the majority of the interviewees believe regarding the consolidation of smaller companies in the LMD-sector, that the e-commerce market will start to congregate once the growth in the sector starts to decrease.

Looking at the development of last-mile delivery that has happened over the past decade, all interviewees agree that the booming e-commerce is the largest contributing factor to the advancements that have happened. When viewing the events of the past year, the astounding growth in e-commerce due to the COVID-19 pandemic is a popular topic within the LMD-sector according to the interviewees. As the CR explained it;

*“Due to the drastic increase in volumes, several new actors are trying to reap the benefits of the current market as it has become easier to find investors for establishing themselves on the LMD-market.”*

*- CR*

However, nearly all of the interviewees are pointing out that these “newcomers” are having issues achieving profitability and that when the market stabilizes, they strongly believe that many of the small actors will either go out of business or be acquired by large established actors or networks in order to reach profitable volumes.

As stated previously, the interviewees all agree that it is the smaller LMD-focused companies that together with the booming e-commerce drives the development of last-mile delivery. They point out that the result of this is that the customer’s expectations are increasing, which according to three of the major interviewed LSP-companies, can create problems. As most of the LMD-focused companies are operating mainly in densely populated areas such as Stockholm, Gothenburg, and Malmö, their service offerings are only available there, but according to the interviewees, it increases the expectations of customers all over Sweden. This creates a discrepancy that many of the interviewees find imperative to today’s business landscape. LSP1b says that customers want the same experience and service offerings no matter what part of Sweden they live in. The same thought is shared by the BGC-interviewee who says that the customers expect the levels of service that the market leaders are providing. BGC further means that the expectations are always increasing and that all actors need to work to implement the most recent services to stay competitive.

The interviewees all share the idea that Sweden’s last-mile logistics is built around the old post offices for parcel deliveries that then transcended into service points at different grocery stores, tobacco stores, and kiosks. They say that the Swedish infrastructure has been built around these service points and they all think that the newer types of last-mile deliveries, such as home deliveries and parcel lockers really started to grow as an alternative option around 2010. LSP4a states that they were the first LSP on the Swedish market to introduce parcel lockers back in 2014 and since then, many of the large LSPs along with some of the smaller LMD-companies are offering parcel locker solutions to their customers.

Many of the interviewed LSPs are focusing on technological solutions such as ICT-system and mobile applications to innovate and make their LMD-activities more effective and to meet their customer’s expectations. Both Company A and Company B are offering their customers live-tracking of the delivery vehicles and the majority of the companies regard this as a trend that is becoming more and more prevalent on the LMD-scene. According to those companies, customers want transparency in parcel tracking which means that the customer wants to be able to track the delivery from start to finish and see if or when a delay is occurring. However, LSP3 brings forth a potential risk associated with the live-tracking of delivery vehicles.

*“Live tracking of the delivery vehicle is an upcoming trend, however, there is another aspect that you need to take into account, namely the security aspect of the courier”*  
- LSP3

The interviewee explains how their company decided to only show the route of the delivery at certain checkpoints. The reason for this is that if a vehicle carries valuable goods, referring to the same problem that cash-in-transit cars have, the risk of robbery or any other type of malicious intent creates a safety risk for their drivers. They recognize the customer value that such solutions offer, but they remain cautious in how to grant this service in a safe way. They further see that there is a trade-off that

needs to be made between offering enough information to make the customer satisfied, while not putting the driver of the vehicle at risk.

Looking at the effects that the COVID-19 pandemic has had on the latest development in last-mile delivery, LSP3 sees the home delivery option as something that has gained popularity from the customers. He further describes that many are working from home now due to the environmentally imposed constraints that the pandemic has caused and that a majority of the companies with employees that can work from home are encouraged to do so. The interviewee also predicts that once the pandemic is over, those deliveries that require a signature from the recipient will most likely decrease as people are coming back to their office. However, LSP3 still believes that home deliveries without signature release, where the courier is allowed to leave the parcel unattended by the customer's house or apartment will increase. The logistics consultant LC has also seen the effects that COVID-19 has had on the contact-free deliveries, e.g. home deliveries without signature release and parcel lockers, and sees the correlation between the restrictions and overall fear of being infected. He goes on by saying that as an example, limiting the amount of contact between the delivery person and the recipient, the risk of catching the virus is becoming significantly smaller in an LMD-environment. However, when discussing long-term developments, LC still believes that customer convenience is the key aspect, where the ability to choose the delivery option that is best suited for the specific context of each order will be dominant in the future. This can be regarded as a common view of all the interviewed companies.

One interesting LMD-concept brought up by LSP4a is the drive-through, where customers can pick up deliveries from a service point with their car, adding a convenient alternative for customers to receive their parcels during home-to-work transits. The interviewed Commerce research-company further discussed ideas such as unmanned delivery vehicles (UDVs) and the testing of drones as potential additions to the LMD-sector in the future, but regarded, just like most of the interviewees, that they are far from ready for commercial use at this stage in Sweden mostly due to current legislation.

There is a mutual understanding amongst the interviewees that the biggest driver behind the innovations in last-mile logistics is due to the fast-paced development of e-commerce. One of the interviewed companies who is a large actor on the Swedish market and has been present during the transition from mail deliveries to more parcel related activities says that it has been hard to cope with the shift, as the number of parcels has increased a lot faster than mail deliveries are decreasing. The general consensus is that this change has been going on for the past 20 years and has dramatically changed the landscape and activities that some of the older companies have been focused on.

The majority of the interviewees see the up-and-coming last-mile logistics firms that are solely focusing on last-mile logistics as the largest drivers behind the innovation in the sector. A large contributor to the shift in the role of the LSPs is according to LSP4a the increased demand for home deliveries from the customer.

Even though most of the interviewees see the smaller last-mile focused companies as the major drivers behind the latest developments in last-mile logistics, the larger companies are trying other ways to stay competitive towards the e-retailers. An

example of this was given by LSP4b is by assisting the retailers with storage, fulfillment levels and by providing them with integrated IT-solutions that will facilitate their order-fulfillment activities.

The LSP2 manager believes that the LSPs need to get better at adapting to what the customer wants and try to move away from trying to find synergies between old routines within the supply chain. The interviewee gives the example of synergies between B2B- and B2C-deliveries that can have a negative impact on the customer experience, as it is not optimal for that type of distribution flow. However, more than half of the interviewees think that finding synergies within your different distribution flows is needed to become more efficient. An example given by LC regarding such synergies is the return flow that can be integrated with deliveries in order to utilize the vehicles better.

#### **4.1.1 Availability of different delivery options**

All of the interviewees have seen a tremendous increase in the number of delivery options available in the checkout at e-retail stores in the last five years. The reason according to LSP2 is the growing volumes and that the customer preferences vary a lot between different customers and for different types of products. LSP2 continues to say that depending on the product, the customer might want it as fast as possible, in other cases, the customer does not mind if the delivery takes several days. Similarly, LC describes how the speed of the delivery is often overrated and how convenience and flexibility are more value-adding for the customers. He goes on to say that the obsession with extremely fast deliveries from the logistics service providers is harmful from a sustainability perspective. Another service mentioned by LSP2 which is hard to perform in a sustainable way, both regarding environmental and economic aspects, is deliveries with narrow delivery windows of 1-2 hours.

*“Those deliveries are hard to perform with efficient routes because of the restricted time windows and require extremely densely populated areas to become profitable with regular pricing. To offer the narrow windows there has to be a high willingness from the customer to pay in order to be profitable.”*

*- LSP2*

Another take on the delivery times and delivery windows comes from LC, who emphasizes the need for logistics operators to offer differentiation in delivery time so that the customers who do not need the goods fast, can choose a longer delivery time at a lower price, allowing the logistics operator more time to plan efficient routes with higher fill rates.

The LSP3 interviewee describes how the convenience of retrieving the parcel at a service point relies on that the package is small and light enough to carry. LSP3 goes on to say that for larger and heavier products, the customer wants to be able to get the goods delivered straight to their door. The need for flexibility is clearly stated in several of the interviews, and the customer demands to have options that can fit into the specific situation of each day. Furthermore, LSP3 goes on to stress the importance of being able to change the delivery option up until the delivery is made. The interviewee described this by saying “life happens” and that the delivery needs to be able to change

when something happens that makes the receiver want the goods delivered in another way or at another time.

When discussing the development of parcel lockers with LSP1b, the interviewee described the use of parcel lockers as a step towards the final solution, which is to get the parcels delivered straight to your home. He described the public parcel lockers as merely a temporary step until the home deliveries are sustainable and economically efficient enough to get all deliveries to either inside your home using smart locks or to a parcel locker by the house. All interviewees that discussed parcel lockers except LSP1a and LSP3 believe in a future of open infrastructure where several logistics operators can use the same parcel lockers. The reason LSP4a believes that shared lockers is the best solution is because it makes it easier for the consumer and more efficient as several actors do not need to place their own lockers in the same place. According to LSP4a, the only reasonable solution is to develop the parcel lockers in the same way that the service points are developed, where several logistics operators deliver the parcels to the same location.

Actors such as Company A who have their own parcel lockers, still believe that there is a need for cooperation and that more than one type of parcel locker needs to exist. This is according to LSP1a to reduce the risk that a dominant parcel locker actor can dictate the prices of the solution. LSP1a believes that the parcel locker market needs competition to reduce the risk of becoming too dependent on one single actor.

The consumer research (CR) interviewee highlighted further potential value creation using parcel lockers, by describing how similar parcel locker solutions are used in Finland where they act as drop-off points for other services such as leaving shoes for shining. From the interview with LS1, it was discovered that the parcel lockers they were developing had these kinds of solutions in mind, where people living in the same apartment building can use the lockers to lend out things like power tools by using a one-time digital key that gives access to the locker.

#### **4.1.2 Challenges of performing sustainable last-mile deliveries**

There is an overall consensus amongst the interviewed companies that there needs to be a bigger focus on sustainability in the LMD-sector. Multiple interviewees are compensating for their emissions and the majority are investing in low-emission fuels. However, a common theme that all of them bring up is the lack of customer willingness to take a larger part in the sustainability efforts. LSP2 describes the challenges related to offering convenience to the customer while at the same time being sustainable. It was described how the customer demands narrow delivery windows which are hard to carry out with high fill rates and with efficient routes. These deliveries damage environmental performance and require a high willingness to pay to become profitable.

Another major contributor to the challenges is according to many of the interviewed LSPs that the e-retailers want to offer free shipping and free returns, while at the same time they want to promote their sustainable deliveries for marketing purposes. The LSP3 interviewee is a strong advocate for trying to emphasize the importance of customer behaviour in the light of sustainability. She further goes on and expresses the double nature of customers where they demand free shipping and returns, while at the same time they are ordering excessive amounts of products in different sizes and

colours with the intention of keeping only a few of the items. As with many interviewees, she believes that the retailers need to take action against this type of behaviour and try to reduce the amount of returns. LSP3 also described the pressure from the retailers to offer sustainable delivery solutions to their customers. The retailer wants to be able to use sustainable deliveries in their marketing to attract more customers. As LSP3 is a large actor, they try to use their influence on retailers to pressure them to choose more environmentally friendly packaging and to reduce the amount of air in the packages. It was described how they see it as their responsibility to use the influence they have to help retailers in creating environmentally friendly and efficient packaging. Improving the packaging efficiency was described as a win-win where the retailer can reduce their cost of the material while the logistics operator can increase the number of packages per delivery.

According to the commerce researcher, CR, free shipping is something that is only common in Sweden and not seen that often throughout Europe. He regards this “phenomenon” as unsustainable both in terms of its environmental and financial impact. By comparing it to Amazon Prime, where customers get free shipping in a matter of 2 days but actually pay a monthly fee for the Prime membership, he thinks that it is possible to achieve at least a more financially sustainable service offering. However, he further emphasises that there needs to be a dominant actor, like Amazon, who can consolidate deliveries and use economies of scale to reduce both costs and emissions.

Another interviewee, the logistics consultant LC, also emphasises the need for consolidation. She states that even though there is a need for sustainable fuels or electric delivery vehicles, the fact that e-commerce is expected to continue to grow will cause increased congestion in the cities.

Looking at the actions that the LSPs themselves can take to become more environmentally sustainable, the LSP1b interviewee brought up an earlier pilot project that they conducted with electric vehicles for their deliveries. They eventually deemed the project unsuccessful due to them lowering their efficiency, as the vehicles had limited capacity both in terms of the number of parcels that could fit in the vehicle but also its range. However, as this project was conducted 10 years ago, he thinks that all the new innovations and progress that has been made in the battery sector could alleviate the range problem that they had in their project. Another interviewee, the LSP2, said that their company has been investing in HVO-tanks at their terminals that can supply their trucks with more environmentally friendly fuel. He further emphasized that they are collaborating with actors who can deliver their parcels by bike in dense city centres. Furthermore, they are compensating for all their carbon emission and it is one of their core focuses in order to gain competitive advantage and to be environmentally neutral.

Increasing the number of parcels delivered during off-peak hours such as during nighttime, is a potential solution that the LS2 interviewee puts a lot of emphasis on. Since they are offering a parcel locker solution that is placed outside and accessible during all hours, he thinks that the congestion in cities can be reduced and the usage of delivery vehicles can be more evenly spread out during the day. He further emphasizes that this can lead to a reduction in the number of vehicles needed to meet the demand for parcel deliveries.

A topic within sustainability that was brought up by one of the interviewees was the social sustainability aspect. Their company is putting much effort towards having fair working conditions and wages for their employees but also the companies that they are working together with. This is a result of the public scrutiny that they encountered after one of their contracted delivery companies had cut down on the driver's wages when they received negative feedback from customers.

The interviewees that have activities related to returns from e-commerce all agree that the excessive amounts of returns is a large sustainability problem. LSP1b describes how the company tries to synchronize the delivery flow with the deliveries in the warehouse operations to try to find synergies and improve the efficiency of returns handling. The combination of handling returns while performing home deliveries is seen as a challenge by LSP1a who described a project where the returns were picked up on the same route as home deliveries of groceries. Unfortunately, the results were not promising as the number of returns is rather low in terms of the area density even in larger cities. A different solution to return management is given by LC2 who describes how the use of parcel lockers can increase the efficiency as the LSP can pick up several returns in the same place compared to picking up returns when doing home deliveries.

The CR interviewee shared insights on how the retailers are making efforts to decrease the amount of returns as it creates high handling costs. The fashion industry was given as an example of an industry that has the largest issues with high amounts of returns and that they are the first to take action. It was presented how some retailers ban customers that continuously order excessive amounts of products only to return the majority of them. LC2 described how these incentives are not fully endorsed by all the LSPs, as returns increase the need for transportation and create a significant part of their operations. This view was contradicted by LSP1a who described how return handling is necessary to gain contracts from retailers even though the returns often result in high costs for the LSP. It was described how returns are a necessary cost to gain the deliveries that are profitable.

## **4.2 Customer interaction in last-mile delivery**

Regarding the influence of last-mile delivery on the customer experience, it was found that there is a consensus throughout all interviewees that the logistics service provider plays a crucial part in creating customer value in one way or another. All interviewees but BGC viewed the home delivery as a substitute for the physical interaction with the employee in a physical store, and how the couriers present themselves and behave is important for the receiver. This was emphasised by LSP3 who describes their couriers as representatives of the retailer in their sales pitch to the retailers. LSP3 describes that they want their couriers to be "clean, polite, helpful with a positive attitude" to create the best possible impression on the customer when handing over the delivery. The contradictory view from the BGC was that the customer that orders online does not choose to do so because they value the interaction with a human being, but rather the opposite. He goes on to say that as long as the delivery is made on time, the customer is happy. The value according to him mainly lies in getting the goods delivered to your home in a convenient way, and the rest is a bonus.



From the interviews, one of the most important factors is found to be before the actual delivery is started, in the number of different delivery options that the customer can choose from. The interviewees all described how there is no silver bullet, not one delivery solution that fits all situations but that the retailer needs to offer a wide enough range of delivery options so that the customer can get the goods delivered in a way that fits into their daily life. The logistics solutions provider (LS1) highlighted the need to have a good fallback option if a home delivery fails, in this case, the use of a parcel locker close by was described as a great way for the customer to receive their parcel when they are available to collect it. This calls for logistics service providers to have a second delivery option for when the receiver is not home. In the case of a faulty delivery, the customer perspective of the distribution of blame between the retailer and logistics service provider was described by the CR in the way that the customer often decides to complain to the retailer, even though they know that the logistics service provider is to blame. Furthermore, the CR described how customers do not choose a certain e-retailer because of their delivery options, but that they often decide to change retailers when their preferred delivery option is not available. Similarly, LSP1b believes that customers often hesitate to return to a retailer where the delivery was inconvenient. When discussing which actor to blame when a delivery is performed poorly, LSP2 brings up the fact that retailers buy logistics services with a certain service level. This means that aspects such as the delivery window that the logistics company offers to the end consumer can depend on what the retailer has specified in the contract.

To get a deeper understanding of how to work with customer experience, the business growth consultancy (BGC) which specializes in mapping and improving the customer journey was interviewed. The interviewee described how the customer journey is divided into different touchpoints where the customer experience can be evaluated. In these points, the customer can decide to either move forward with their purchase or switch to a different retailer. The interviewee goes on to describe that some of the key touchpoints are signing up for an account on the website, if the payment option that the customer wants exists, or if the preferred delivery option is available at a reasonable price.

A concept introduced by the BGC is ROX which stands for return on user experience. The concept was described as how satisfied customers tend to buy more expensive products, are more likely to remain loyal customers that return to the same store, and to recommend the store to others. This is according to BGC used to show how a retailer can increase their revenue by investing in improving the customer experience where it matters the most. He further explained that the relationship between customer satisfaction and profitability has been highly prioritized by retailers as the customers have shifted their shopping habits to online stores. Today 70-80% of the companies that the BGC work with are using NPS or similar key performance indexes (KPIs) to measure customer satisfaction. This number is continuously increasing and companies are prioritizing the customer experience as a key strategic measurement.

### **4.2.1 Using feedback to improve service quality**

When asking the logistics companies about how they gather feedback to improve their services, the results match the views of the BGC who says that most of the companies today use NPS, or corresponding methods to map the customer satisfaction. Many of the logistics companies send out a short survey after a parcel is delivered, where the customer can give feedback on how they experienced the delivery. Company C even reaches out to their customers that leave a bad review and try to talk to the dissatisfied customer to find out in detail what caused the issue. How the feedback is used differs between the companies, Company A uses their own app to collect the feedback, and based on what delivery solution is used for the delivery, the feedback is sent directly to the correct branch of business development. If the feedback is relevant for the e-retailer's operations, the data about what the customers like or dislike is shared with the e-retailer to enable them to use it in their business development. The feedback that is gathered by Company Bis matched with the corresponding employee that performed the delivery. This is used to reward the employees that perform well and incentivise the employees to go the extra mile to make the customers happy.

In cases where parcel lockers are used, Company E conducts face-to-face interviews where they simply go out to one of their lockers and talk to the customers that come there to get their parcels and ask them about their experience using the lockers and if anything could be improved. Company F is another parcel locker operator, but with lockers that are used for both e-commerce deliveries and commercial use in the construction industry. As the lockers are bought by the building owner where the lockers are placed or by the manager at the construction site, the company gathers feedback from both business customers and end-users.

### **4.2.2 Descriptions of customer interaction**

In this section, the interface between the logistics service provider and the end customer will be described. The description will be made from several different perspectives such as the logistics service provider, logistics solutions companies as well as research and consulting companies. As some interviewees gave extensive information regarding the customer journey, they appear in greater detail in the following section while other actors appear briefer.

#### **Company C**

As a large global logistics service provider, Company C has long experience in developing and refining their user interface. The interviewee described the development of the company's last-mile logistics services since 2013/2014 when e-commerce started to grow rapidly. The company was already performing home deliveries and had a network of service points all over the country. When choosing to get parcels delivered with the company, the customer received an SMS with instructions where the customer could answer with the number "1" to choose home delivery and "2" for delivery to a service point. As the home deliveries were conducted during daytime, the company experienced difficulties to successfully conduct the deliveries as many of the customers were not home during the day. The high number of failed deliveries created the need for the company to rethink how the deliveries were made, starting with establishing a large number of new service points where the failed deliveries could be left for the customer to pick up. To expand the amount of delivery

options, the company was the first actor to introduce parcel lockers in Sweden in 2014. The company continued to develop a website where the customer would choose what service point they wanted the parcel delivered to instead of previously leaving the parcel at the closest service point. The development of different delivery options has continued to increase and today the company offers six different delivery alternatives for the customer when they enter the website to manage their delivery.

When entering the webpage, the customer can see an estimation of delivery date, and the first function is to give the customer the option to push the delivery forwards by up to 7 days if the customer is not home at the estimated delivery time. The second option available on the website is to leave the parcel in a “safe space” which means to perform the home delivery without a signature release. This option was introduced 3 years ago as a countermeasure to the failed home deliveries. This option is enabled by the digitalization and introduction of electronic contracts where the receiver gives permission for the delivery to be left unattended. The courier takes a photo of the parcel when it is delivered to show that the delivery is made in a safe place. The retailer has the ability to remove this option if the goods are too valuable or if there is a risk that the goods can be damaged if left outside.

The third option is to perform the delivery to a neighbour. When choosing this option, the name of the neighbour that will receive the delivery needs to be included and the company performs an ID check on delivery.

The fourth option is to get the parcel delivered to a service point, or a parcel locker of their choosing. When choosing to get the delivery to a parcel locker, the customer can choose either a locker managed by Company C or a locker managed by a third-party parcel locker company that Company C has a partnership with.

The fifth alternative is to change the delivery address to give the customer a chance to get the parcel delivered to any other location in the country. In a survey conducted by the company, it was found that 30% of the customers want to be able to change the location or type of the delivery.

The sixth and last option is called “vacation hold” which was implemented to let the customer delay the delivery and get the parcel delivered at a new date within 30 days. The vacation hold option enables the customer to get the parcel delivered at a later time if they are unavailable for a long time and stops the parcel from being sent back to the retailer.

As the company performs *next-day deliveries* which means that when the company receives the parcel from the retailer, the delivery is often made the next day, the customer needs to be fairly quick to choose what type of delivery they want. If the customer chooses home delivery, the delivery takes place the next day within a three-hour delivery window. The customer is given information on when the parcel arrives at certain key checkpoints during the delivery instead of using live tracking. The company has decided to not offer live tracking of the parcel as it is being delivered because of security reasons for the courier. The interviewee described that it could be dangerous for the courier if the truck can be tracked at times such as when a new iPhone has just been released and the truck-load is extraordinarily valuable and at a higher risk of being robbed.

Because Company C is operating internationally, orders from outside of the EU will be charged with a customs fee and an added tax fee. This information is not always visible for the customer when shopping online which creates confusion when an added charge

needs to be paid when the order arrives. The company works to influence the retailers to increase the transparency in what the end cost of the order will be as soon as possible in the customer journey. To make it easy for the customer to pay the fees, the company has created a separate website which the customer is guided to from a text message when the order is on its way. On the web page, the customer can see the calculations for the different fees and pay using the convenient mobile payment application "Swish".

Previously, the customer had to pay in cash when the package was delivered, which was a problem in Sweden where a lot of people use credit cards and do not have cash available at home. After paying the fee, the customer gets a receipt showing that they have paid all of the required fees.

### **Company D**

Interaction through the use of IT-systems with notifications and information on delivery times is standard for most companies today. Furthermore, the option to carry the packages inside has been available for quite some time where one step further is the installation of products. This includes delivering goods inside the customers' house through the use of "smart homes", where the LSP can deliver groceries all the way to the fridge. The insurance aspects of going inside the house of the customer are what slows down the development of these kinds of solutions and require regulatory measures to be able to be implemented on a large scale. The interviewee goes on to describe that they believe that the way the courier presents themselves is important as the courier's interaction with the customer can now be seen as a representative of the shop employee.

### **Company B**

As Company B only performs home deliveries at night, the interface is built to create the best possible chance for the delivery to be successful. When a customer chooses the company as a logistics service provider on the retailer website, the customer can choose a delivery time within 7 days. When a delivery date is chosen, the customer receives an email confirming the delivery and gives the customer instructions on what information is needed to perform the delivery.

The information given to the company by the retailer only consists of the address and the phone number of the customer which means that they require additional information to perform the delivery as efficiently as possible. The company sends an SMS to the customer asking them to give as much information regarding what type of building it is, if the door is on the front or the back of the building, what floor of the building, if there is an elevator in the building, if there is an intercom to ring the doorbell and if the door requires a code to open. The interviewee LSP2 describes that 40% of the failed home deliveries are caused by the courier not having the code to enter the building.

The next step on the interface asks the customer to choose between delivery in person or if the parcel can be left outside the building. The third option is if the courier should ring the doorbell or knock when arriving, the option to knock was described as a more subtle way to announce the arrival in cases such as when the receiver has a sleeping child that would be disturbed if the doorbell is used. Similarly, to the case of Company D, Company B offers the option to leave the parcel outside if both the customer and the retailer approve of the parcel being left unattended. If the parcel is left unattended,

the courier takes a photo of the parcel at the location to show that the delivery has been made. If there is a need for a signature when delivering the parcel, the next step is to inform the customer that they need to be at home and that an ID check will be performed when delivering.

When the parcel arrives at the logistics service provider's terminal, an SMS is sent to the customer where they get the ability to trace the delivery, a feature that has been available since 2014. The customer can see the car on a map as it is closing in and the time of delivery is updated as the car gets closer. The customer can see how many stops the car will make before arriving at the address of the customer and in case of a delay, the customer is informed. If the customer changes their mind and wants to change the delivery date, there is a possibility to change it up until 15:00 the day of the delivery, after that the route optimization is carried out and the route is set. If the customer has any questions regarding the delivery, the company has both a chatbot that can answer frequently asked questions and a phone service that the customer can call.

If a parcel is lost in transit, the retailer often sends a new item because of the speed of the deliveries which are often performed either the same day or the next day. The interviewee describes that many of the items that are ordered before 15:00 will arrive the same day. This makes it both easier and faster to send a new item to the customer compared to finding the missing parcel, which instead is sent back to the retailer. When the delivery is finished, the customer gets the option to give the delivery a rating and leave a comment with feedback.

### **Company E**

Company E develops both the lockers and the software that is used to operate the lockers. When developing the interface, their main objective is to create a solution that is as simple and easy to use as possible. The interviewee described that the importance of a visually attractive design has low importance compared to a functional design, as the customers simply want a solution that works. When comparing the interfaces of parcel lockers and the interface of e-commerce websites, the parcel locker has one simple task, whereas the website wants the customer to stay longer and create a need for the customer to buy.

The identification of the receiver of parcel lockers varies a lot between logistics service providers and countries. As an international company, Company E has created a range of solutions to open the lockers such as Bluetooth keys, pin codes, NFC, key tags used to enter apartment buildings, and the Swedish Bank ID authenticator. The lockers need to be easy to open both for the one delivering the parcel and the one receiving it and safety is of utmost importance. The reason for the lockers having a digital screen is if there is a malfunction with the Bluetooth or if the customer does not have NFC on their phone they can use the screen to input the code and open the locker.

### **Company G**

As a software and technology firm, the interface is a central aspect of the operations of Company G. The influence that Company G has on the actual design of the interface of the lockers varies from customer to customer. As many parcel locker producers acknowledge the importance of the user interface and the set of functionalities in the parcel locker, some actors want complete control over the design and only buy the backend digital lock functionality and build their own application, while other actors

decide to buy a finished interface from Company G. As the customer expectations are always changing, LS3 has a clear strategy on how to work with continuous improvements to develop their products according to the customer demands. LS3 describes that there is high uncertainty in what functionalities get adopted by the users which calls for a pull-centric strategy where the functionalities developed are in line with what the customers want.

The interface in the parcel lockers offered by Company F is designed by Company G and was purchased as a complete interface. The companies have a close collaboration when designing the interface to make sure the functionality is in line with the expectations of Company F.

## 5. Discussion

The following chapter intends to discuss the empirical findings in relation to the literature. The discussions aim to bring forth areas of consensus or contradiction between the sources in order to provide answers to the research questions. The discussion will be divided into two areas related to each of the research questions.

---

### 5.1 Value creation in last-mile delivery

This section aims to discuss the findings related to the first research question:

*In what ways does last-mile delivery solutions offered by logistics actors add value to the e-commerce value chain?*

The combining of capabilities described by Vargo and Lusch (2004) to create a valuable customer offering is apparent in the e-retailer - logistics service provider relationship. The e-retailer cannot offer any value if the goods are not delivered and the logistics service provider would not have any goods to transport without the e-retailer. Given the value co-creation of the cross-organizational collaboration between two sectors, the development of e-commerce acts as an indicator for the future value of deliveries. Hence, it is necessary to discuss the development of the e-commerce landscape to understand the future value of the logistics service provider in the e-commerce value chain.

The current pandemic and its influence on consumer habits show how the logistics service providers quickly need to adapt to the growing volumes and meet the need for contactless deliveries. The COVID-19 pandemic has affected most businesses across the globe, forcing them to adapt to the new environment and transition into a more virtual business landscape. New innovations and a change of focus have been characterizing the way of businesses as new business models emerge. With the 40% increase in Swedish e-commerce growth that Postnord (2021) reported, it is still hard to define how much of the increase is due to the pandemic and the restriction measures that have been put in place to minimize the spread of the virus. However, it is highly likely that it has had a large effect considering the growth projections of 11% for 2020 by Postnord (2020a), as the projections of earlier years have been fairly accurate.

There is no doubt that the e-commerce sector is growing and that even though the traditional retail channels are still accounting for the majority of the sales, e-commerce is gaining larger market shares year by year which pressures the logistics service provider serving the e-retailers to keep up with the growth. In the literature, different drivers of e-commerce have been identified and the history behind the transformation from traditional retail to online shopping was described. As discussed by Visser et al. (2014), with a young population that is more used to the internet in addition to the results of the survey by Postnord (2021), showing that older people are rapidly discovering the convenience of internet shopping and getting goods delivered, a new era of e-commerce is evolving. The CR interviewee contributed to this idea where new customers have been introduced to e-commerce, much due to the environmentally imposed constraints caused by the COVID-19 pandemic. Furthermore, all interviewees agreed that the consumers are introduced to new online purchasing habits and delivery

solutions that further reinforces the growth of e-commerce and last-mile deliveries. These findings are in line with the Guthrie et al. (2021) study that showed how the pandemic has evolved the behaviour of consumers towards e-commerce and that reticent late adopters have started to explore the benefits of online shopping.

The question as to how the demand will change in a post-pandemic world is uncertain, but both the literature and the empirical findings lean towards a potential minor backlash in terms of e-commerce volumes before the increase continues at the same rate as before the pandemic. Once restrictions have been lifted and the population is able to move as they please, the CR believes that shopping malls will see a large increase in visitors. By looking at Israel, who have been effective with their vaccination process, the interviewee assumed that Sweden can potentially see similar development where people return to buying certain types of items in physical stores. However, looking at the investments that e-retailers have made in order to increase their e-commerce capacity during the pandemic indicates that they believe that their business will continue to grow. Many of the interviewed companies seem to believe that the e-commerce growth will eventually saturate and that both traditional retailers and e-retailers will reach a mature level where both will coexist. When the sector stabilizes, the LSP4b interviewee believes that many of the new companies that have hard times achieving profitability will either go out of business or be acquired by larger actors. Furthermore, many traditional retailers are likely to develop mix-channel approaches in order to reach all customer bases. This will require logistics services which adds to the importance of LSPs in the value chain and can help to further establish their role as a crucial actor.

### **5.1.1 Value creation through innovation**

With the evolving e-commerce, the last-mile logistics actors are forced to adapt and transcend beyond mere transportation activities and go into more innovative and service-oriented business models in order to stay competitive. As the empirical findings show, the transformation for some LSPs from mail delivery to a large share of parcel deliveries makes it hard to quickly redirect strategies and resources, especially for large organizations. However, the large companies have rigid infrastructure and experience that the new actors lack. Even if last-mile deliveries may only be a small fraction of their overall business, they can rely on their larger market shares and the scale of their operations to stay competitive. Furthermore, as the interviewee LSP4b stated, they offer other services such as assisting retailers with storage and order-fulfillment activities which strengthens their role in the e-commerce value chain.

Besides the disruptions of the COVID-19 pandemic, another driver for innovation in the sector is the introduction of new actors on the market.

With the increasing e-commerce activity, the LMD-sector has gained interest from investors allowing new actors to establish on the market. According to the interviewed companies, these new innovation-driven actors are contributing to the development of last-mile deliveries through different technological solutions such as route optimization, applications, and live-tracking of deliveries that more LSPs are adopting. Furthermore, the BGC stated that customers are expecting the same levels of service from all logistics actors that the market leaders are providing. This was described as an



injection of competition that forced the established actors to innovate as they had been too reliant on the use of service points.

In regards to the technological advancements, Visser et al. (2014) stated that LSPs are not very eager to implement this type of ICT-technology, but the environment surrounding e-commerce and last-mile deliveries has changed in many ways since 2014. The interviewees believe that new ICT-technology increases the customers' expectations on the deliveries, which forces the already established LSP companies to follow to stay competitive. These types of developments add another layer of convenience to the customer, by being able to get updates on their delivery in terms of seeing exactly where the parcel is and when it will be delivered. However, as LSP3 explained, the security aspect of such technologies is important and needs to be taken into consideration as a trade-off when assessing the added value.

Through route optimization, the consumers can get faster and more accurate delivery times. In addition, it increases the flexibility of the delivery by making it possible to change the delivery date, time, and method after the point of purchase, which adds value to both e-retailers and their customers. By looking at it from the concept of S-D logic and the second aspect introduced in the framework by Yazdanparast et al. (2010), it is unclear if the perceived value of the customers is increasing, and if so by how much, with live-tracking technology. A deeper evaluation of the contribution to a successful customer experience compared to the investments they require is needed in order to conclude on whether it is worth investing in. This is especially important for the large LSPs, where last-mile logistics are only constituting a smaller fraction of their overall business.

Logistics service providers help e-retailers to focus on their core competencies and on enhancing their brand-owned touchpoints that can influence the customer experience. As Lemon and Verhoef (2016) and Hallikanen et al. (2019) stated, marketing, website attributes, and loyalty programs are touchpoints that are important for the customer and can be impactful for a successful customer journey. Thus, allowing e-retailers to spend their resources on improving these features while LSPs are developing new attractive ways to deliver the products, the e-commerce value chain continues to grow from different directions.

Moreover, the activities that the LSPs perform for the e-retailers and especially the last-mile deliveries incorporates touchpoints that can be considered partner-owned and are, according to the authors, crucial for creating the seamless experience that customers are seeking. This further adds value to the e-commerce value chain that is hard to obtain by the e-retailers themselves, thus increasing the importance of LSPs. This is especially emphasized as a trait in S-D logic by Vargo and Lusch (2004), who described how S-D logic is about bundling core competencies to create valuable offerings by working across organizational boundaries.

### 5.1.2 Value creation through delivery options and returns

The innovative landscape of last-mile delivery has resulted in new ways of delivering parcels in the B2C-sector. With the increased number of parcels delivered year by year, the mandate of the customers has become prevalent where the consumers' need for convenient solutions is driving the innovation of the logistics solutions. This was supported in all of the interviews where the main factor behind the variety of delivery options available on the market is the growing customer need for convenience in different ways. These empirical findings correlate with the findings of Wang et al. (2019), who state that the consumers are playing a big part in the development of last-mile logistics services. Furthermore, the third aspect in Yazdanparast et al. (2010) S-D logic framework strengthens the hypotheses of value co-creation by the involvement of the end customer in the logistics services. The author even described the customers' ability to choose what type of delivery they prefer for their purchased product as the most valuable in the context of delivery.

As every customer has their own preference in terms of delivery method, delivery time, time window for home deliveries, the varying needs call for varying methods. From the interviews and the reports by Postnord (2021) and NETS (2021), it is clear that there is not just one method that is better than the other. Instead, it comes down to the preference of the customer in relation to the services offered at checkout. From the interview with LSP1a, it was found that convenience and flexibility in the delivery are seen as more valuable than the speed of the delivery. The article by de Kervenoael et al. (2020) further emphasized the time-based marketing promise (TBMP) that accounts not only for the time from order to delivery but also takes the delivery window into consideration. By being able to change the delivery window, the customer gains flexibility so that they can fit their delivery into their daily schedule in case of sudden events. However, looking at it from a LSP perspective, changes to the delivery route have to be made reasonably early for the company to be able to perform the route planning. One example of this was found in the interview with LSP2 who accepted rescheduling of the deliveries up until 15:00 the day of the delivery.

As the logistics service provider is the one who performs the delivery, they possess the knowledge of what delivery options, and what aspects of the deliveries are valued the most by the customers. They can use this knowledge to inform the e-retailers and hence help them adopt new delivery solutions such as unattended home delivery where they can put the parcel in a safe place. This will add more convenience to the customer and can also help e-retailers to differentiate themselves from competitors and thus, logistics service providers play an important role in the e-retailers' competitiveness. This was further emphasized by the fourth aspect of the S-D logic framework by Yazdanparast et al. (2010), showing the importance of close collaboration between logistics service providers and the e-retailers in acknowledging and capturing the customers' perceived value of the logistics services. Collaboration and bundling of different capabilities from different actors and cooperating as a unit to create superior customer value as described by Rice and Hoppe (2001) and Vargo and Lusch (2004), can be seen in how parcel locker companies and the home delivery companies combine their offerings to create a better solution compared to what they can offer by themselves. The home delivery company can utilize the parcel lockers when a home delivery fails and leave the parcel in a parcel box in close proximity to the home of the customer. The solution creates value for all the stakeholders involved by allowing the parcel box company to increase the utilization of the lockers, the home

delivery company reduces cost as the failed delivery as a new trip is not necessary, and most importantly it gives the customer the parcel quickly and conveniently.

From the empirical findings, home delivery without signature release is considered a delivery method that will continue to grow even after the pandemic is over. The results of Postnord (2021) survey showed a large increase in the preferred delivery methods for this type of unattended home delivery, allowing e-commerce customers the convenience of not having to stay at home. Furthermore, as stated by Friedh (2017), performing deliveries during the evening can be beneficial in many ways, as the customers are more often at home and hence reduces the chance of failed delivery in addition to the less congested streets during the evening hours.

There are factors influencing when home deliveries might be a better choice of method compared to service points and parcel lockers. As home deliveries is a push-centric delivery where the parcel is delivered to the customer's doorstep, the value of this type of delivery is especially high when it is a large or heavy parcel as the customer does not have to travel or transport it from a collection point themselves. The delivery window of home deliveries is receiving more attention than previously. Having more windows to choose from, both in terms of day and time but also the duration of the window, has become increasingly important for the customers to fit their everyday schedule.

During the interviews, it was reoccurring that the parcel lockers were seen as a delivery method that will continue to grow rapidly. The use of parcel lockers in Sweden has seen a large increase in recent years and there have been varying approaches by different actors. One of the actors develops open infrastructures that any logistics service provider can use, while other actors develop closed systems only available for themselves. The different and aggressive development by the actors show signs of a turbulent development going forward with high competition among the actors as they try to gain market shares. The new solution that Company F is launching has an open infrastructure, allowing all actors that sign a contract with them to use the parcel lockers at the same cost as a service point agreement which can be very beneficial for both customers and LSPs. Multiple of the interviewed LSPs believed that the open infrastructure approach was the way forward, allowing the logistics service providers to focus on the delivery activities and not have to build their own infrastructure. The interviews showed that all except one of the LSPs that already had their own parcel locker solution were still very inclined to use the open infrastructure if their own lockers are full. One concern raised by LSP1a was the risk of becoming too reliant on one single parcel locker actor as that actor has full control over setting the price for using the lockers. Instead, the interviewee believed that some competition is healthy and will benefit the customer. At the same time, there are advantages of having large actors who can afford to place lockers in more places than the most profitable, increasing the availability of the solution in rural areas.

The value of the delivery solution and its characteristics such as *times at which goods can be collected*, *delivery window*, and *retrieval time for customers* shown in Table 2 in section 2.5, is a result of the difference in convenience in comparison to other solutions and compared to shopping in a physical store. The added value of receiving a parcel using home delivery is significantly lower if you live in a city where the service point is located a few minutes' walk from the customer's home compared to if the customer lives in a rural area where a long trip with a car is required to get to a service

point. Similarly, the opening hours of a service point are often longer in cities compared to rural areas which increases the value of solutions such as parcel lockers that are available all day, every day of the week.

Building on this discussion, the value of a parcel locker that is available anytime and home deliveries that remove the need for the customer to make a trip to retrieve the parcel has its most value in rural areas which is unfortunate, as many of the new actors focus on providing their solutions in cities where the solution is available to a much larger customer base. This was acknowledged by interviewees from Company A and Company F who both described it as a societal responsibility to offer the solutions everywhere and not only where it is most profitable.

Although the Postnord (2021) report showed that parcel lockers only constituted 12% as the preferred delivery method, it had still increased in popularity compared to 5% in 2019. A factor that influences the statistics in terms of preferred delivery methods is that the availability of the different methods is not the same. If Sweden would have had a more geographically dense network of parcel lockers then the statistics would most likely look different. Sweden has been using the service points for a long time as the standard way of delivering packages, and hence that infrastructure is well-established throughout the country. This has had a large impact on the way that customers prefer their packages to be delivered as it has been the way customers are used to. Looking at countries like Finland and Denmark where parcel locker services are more developed than in Sweden, the statistics on the preferred method of delivery are different. In addition, even though more types of delivery services become accessible to the consumers in Sweden, not everyone is willing or ready to try a new type of delivery method as they might already be satisfied with their current method, which also influences the results of the surveys.

Furthermore, parcel lockers are best suited for smaller parcels, as the lockers normally cannot fit larger parcels inside them. The parcel lockers are built with different sizes of the individual lockers to accommodate varying sizes, but having very large lockers would lower the number of lockers that one station can have. As the customer needs to transport the parcel to their home themselves, the most value is added with smaller and lighter parcels that are easy to carry.

As stated by Wang et al. (2019), by delivering to parcel lockers, better consolidation is possible compared to when performing home deliveries. Delivering a larger amount of parcels to one destination was available even before the parcel lockers started to establish on the Swedish market, through the use of the service points. However, the convenience and accessibility is better with parcel lockers as you normally don't have to queue for the lockers which you might have to with the service points during peak hours. Furthermore, having the parcel lockers placed outside increases the accessibility as both customers can pick up the parcels and couriers can leave parcels, at any time of the day. Another aspect of using automated delivery solutions is described by Postnord (2021) and PTS (2020), during the pandemic as the customers want to avoid queues at service points they can use parcel lockers instead. The COVID-19 pandemic and the different waves of spread and environmentally imposed constraints on the population indicated that the customers were more prone to use parcel lockers and home deliveries to avoid crowded service points during times of high community transmission of the virus.

Another result of the increased e-commerce activity related to COVID-19 is the need for returns. As the customer has limited information regarding the physical attributes of the items, the availability of convenient returns is an important part of the purchasing decision. The difficulty for the e-retailers and logistics service providers is to provide the customers with returns that are convenient while at the same time stop the customers from abusing the return system by ordering excessive amounts of items only to return the majority of them.

Offering the customer convenient ways of returning their purchased goods is crucial and free returns were regarded as the third most important aspect of delivery in the survey conducted by Postnord in 2021. This shows how highly valued the returns are for the customer and thus the importance of LSPs involvement in the e-commerce value chain. However, there is no such thing as free returns, as someone has to bear the cost of the transportation and handling whether it is the LSP, the e-retailer or the customer through embedding the costs in the price of the product.

Based on the interviews, there was no indication of differentiation in the return management between different types of products based on theories such as MVT described by Blackburn et al. (2004). The focus when handling returns was found to be on efficiency in the operations of the logistics service provider, by trying to include pickup of returns in the same route as home deliveries and by picking up returns from parcel lockers. As returns are regarded as a cornerstone of e-commerce, it is crucial for the logistics service provider to be able to handle the returns efficiently.

It was also found how there are conflicting interests from LSPs as they, on one hand, want to reduce the number of returns to increase sustainability, but on the other hand, the returns are a source of income as it creates the need for transportation. The profitability of handling returns as a LSP was described differently in the interviews where one of the interviewees described it as highly profitable, while another interviewee described the return handling as a necessary operation the LSP must conduct. This is done to support the retailer even though the volumes in relation to the added resources needed to handle returns often are too low to be profitable.

### **5.1.3 Sustainability issues with last-mile deliveries**

As awareness of environmental sustainability issues increases in society, the customers of e-commerce are demanding more sustainable delivery solutions. Both logistics service providers and e-retailers acknowledge the increasing value of sustainable deliveries, but the sustainability of last-mile deliveries is a complex issue to solve. While the customers say that they want sustainable deliveries, the interviews showed that the vast majority of the customers choose free delivery over sustainable options in most cases. This was further shown in the survey conducted by Postnord in 2021 where customers stated that free deliveries and returns are the third most important aspect of the delivery. There seems to be a gap between what the customers say in the report by Postnord (2020b), showing that 8 out of 10 would choose a sustainable delivery option for the additional cost of 5 SEK, and how they actually act. This is also pointed out by the interviewees working in the logistics sector who describe how the customers often demand sustainable deliveries while wanting deliveries performed with short delivery times and short delivery windows. The true nature of the customers was described by one of the interviewees saying if the option of free delivery exists, most customers will choose it every time. Similarly, the retailers want to use the

fact that they offer sustainable delivery options in their marketing, but at the same time, they need to offer other delivery solutions to stay competitive and give the customers the availability of options to choose from.

During the interviews, it was described how the customers are often contradictory in saying they want to be sustainable, while still ordering excessive amounts of items in different colors and sizes with the intention of only keeping some of them. Hence, the customers' conflicting actions are creating problems for both the logistics actors and the e-retailers. This coincides with the description of the LMD-sector by Bergman et al. (2018) describing how the complexity increases when different stakeholders have conflicting interests. The deliveries need to be conducted as efficiently as possible to reduce emissions, while also offering quick deliveries with narrow delivery windows, making route planning less effective compared to when delivery routes can have longer planning horizons.

As described by Hjort (2013), decreasing returns should be accomplished by increasing the preventive measures, while the remaining returns should be conducted as efficiently as possible. With the growing interest from consumers to buy vintage products and items produced using recycled materials, retailers will most likely continue to increase their efforts to introduce circular business models. This will further increase the importance of return processes in order to get the products back to the retailer.

As mentioned by several of the interviewees, focusing more on consolidating and less on fast deliveries and free returns, city centers can become less congested and have less harmful emissions, while still meeting the demand for increased amounts of parcel deliveries. The increased efficiency of consolidated deliveries to service points and parcel lockers instead of home deliveries is supported by Kjellsdotter Ivert et al. (2020), as long as the customers make their way to the service point using an environmentally friendly method such as walking. If the customer decides to use their car to drive to the service point, a home delivery solution would result in less emissions as it delivers several parcels on the same route.

## 5.2 Customer interaction and its effects on the customer experience

In this section, the interface between the logistics service provider and the customer will be discussed using the perspective of the interviewees.

This section further aims to discuss the findings related the second research question: *According to logistics actors, what aspects of the customer interaction with the logistics service provider contribute most to a valuable customer experience?*

The interviewees all agreed that the interface is crucial to create a good customer experience. With growing e-commerce, the human interaction when shopping in physical stores is substituted with the e-commerce and delivery interfaces. As the use of automated delivery methods grows, and new methods such as autonomous delivery vehicles emerge, the interface could become the only interaction with the customer and substituting the human aspects of service points and home deliveries.

### 5.2.1 Important aspects of the interface

In the empirical findings, it was apparent that the logistics actors believed that the interface is an important aspect of the customer experience. When discussing the implications of customer experience on value creation, the concept of return on user experience (ROX) which was introduced by BGC has a striking resemblance to the findings of Subhashini and Hemamalini (2016). Both theories explain the correlation between customer satisfaction and profitability as satisfied customers tend to return, purchase more and recommend the service to friends which can be seen as a social touchpoint.

One of the partner-owned touchpoints is the interaction between the courier and the customer during a home delivery. As the point of delivery is one of the last touchpoints with the customer, the quality of the delivery service will be easily remembered when a customer thinks of a recent online purchase and considers whether or not to return to the retailer again. To see the logistics service provider as a substitute of the employee in a physical store is acknowledged by all interviewees, but with one interviewee (BGC) being more skeptical regarding the importance of human interaction. As most of the interviewees share these views, it indicates that the logistics service provider can be seen as an extension of the e-commerce retailer. The BGC strongly agrees that the delivery is an essential part of the customer experience, but that the human interaction in a home delivery does not necessarily add value compared to an automated delivery solution. It was described that customers do not choose to buy online to have human interaction, but rather the opposite. These findings show that there might be a misconception of what aspects of the delivery are value-adding for the customers. This correlates with one of the challenges described by Yazdanparast et al. (2010), that logistics managers are having a hard time identifying the value-adding aspects of their service from the customer perspective. The real value-adding aspects are more related to aspects such as, that the delivery is on time, that it is quick, and that it is delivered in a convenient way rather than the human interaction at the point of delivery.

When analysing the empirical findings, some aspects of the interface were mentioned often throughout the interviews, while some aspects were unique to specific actors. One of the prominent aspects of a partner-owned touchpoint was that several of the interviewees mentioned the ability for the customer to trace the delivery in real-time as it is being delivered. This functionality had been used for several years by Company B was seen as a strong competitive advantage for a long time when they were one of the few logistics service providers offering it. Company A has recently started offering live-tracking of some of their deliveries and in the interview, it was described that they had felt like they were falling behind on a lot of the technological advancements because of the long lead time for innovations in the organisation. Generally, the large, well-established logistics service providers are falling behind in designing user-friendly interfaces compared to the newcomers on the last-mile logistics market. The large traditional actors have significantly longer development cycles and changing the interface can be a 10-year project. Company C agrees that customers value the live-tracking highly, but believes that the security risk for the couriers is a too large trade-off for implementing the tracking and that a checkpoint tracking system provides enough information to keep the customer satisfied. This can further be related to the challenges described by Yazdanparast et al. (2010), where the perceived value of a service provided is different from the value received. The challenge related to the gap of these two perceptions requires the involvement of the customer in order to be reduced.

Another important aspect of the delivery interface is the ability to choose delivery windows and delivery time. By being able to choose the delivery window and delivery time, the customer is involved in the co-creation of value as explained by the third aspect of the S-D logic framework by Yazdanparast et al. (2010). This helps the logistics service provider find efficient and valued services from the perspective of the customer. Company C stated that 30% of the customers want to change the delivery type or delivery time. Company B also wants to offer the customers flexibility to change delivery time up until as late as possible for the customer, which resulted in the customer being able to change the delivery up until 15:00 on the same day as the delivery. These types of last-minute changes allow the customer to feel safe to choose a home delivery even though they might not know if they are available to receive the parcel at the given time and have the ability to change it easily.

The time of day for the delivery is another aspect that Company B believes is an important factor for customers. As a home delivery actor, the attended home deliveries require the customer to be present in order to receive the parcel. Company B saw it as a large advantage to offer deliveries during the evening when the customers are home from work. This aspect was described as less important during the pandemic when a large share of the customers works from home. Similar effects are assumed to apply for unattended home deliveries that are less necessary during the pandemic, but that has been growing in popularity for a long time.

Some delivery characteristics that are only offered by individual actors are the “vacation hold” option by Company C and the “knock instead of ringing the doorbell” by Company B. These options show the ways the companies try to differentiate and offer something that the customers value that no other actor offers by having a unique set of delivery options for the customer to customize the delivery solution. One aspect that stands out is the service provided by Company C where they make it easier for



the customer to pay the tax- and customs fees through their platform using Swish. This was seen as a huge improvement in customer experience by the interviewee as it removed the unexpected fees and made the online purchases from outside the EU more transparent as it shows all the hidden costs.

One aspect of the customer interface where the views of the interviewees differ is the question of using an app or a webpage to interact with the customer. Some interviewees described it as an advantage to use a webpage because it does not force the customer to download an app that is rarely used while other interviewees preferred to use an app. When discussing the parcel locker interface with LS3 it was described that the functionality of the interface is much more important than having a flashy design. This applies to the interface of all of the delivery methods as the customer wants a simple and easy-to-use solution. As was found in previous sections, the convenience of the solutions is always what is most valued by the customers which can be an explanation of why a simple but effective interface is the best solution. As described by BGC, the customer does not shop online because they want to interact with a logistics service provider, but because they want the items delivered as effortlessly as possible.

### **5.2.2 Improving value creation of the interaction**

When a home delivery is unsuccessful or some aspect of the interface such as the delivery missing the delivery window, the customers often complain to the retailer which indicates that the customers see it as the retailer's responsibility to make sure that the delivery is carried out correctly. This shows that even if the customer believes that the logistics service provider made a mistake, the retailer is the one who is held accountable and needs to compensate the customer. This indicates that the e-retailer needs to take an active role in shaping how the delivery is performed as it is reflected back to them and forces them to take action.

On the other hand, dissatisfied customers that complain about the delivery windows being too long, often blame the logistics service provider, not knowing that the retailer could have chosen a better service level agreement. This shows the amount of responsibility that is being shared between the actors. The correlation between customer satisfaction related to delivery and if a customer chooses to return to the retailer again is uncertain according to the interviews, but it is believed that it would require serious flaws for a customer to choose to never return to the retailer. The increase in profits by 25% if the amount of retained customers increase by 5% described by Reichheld (2001) shows the importance of investing in sustaining the current customers.

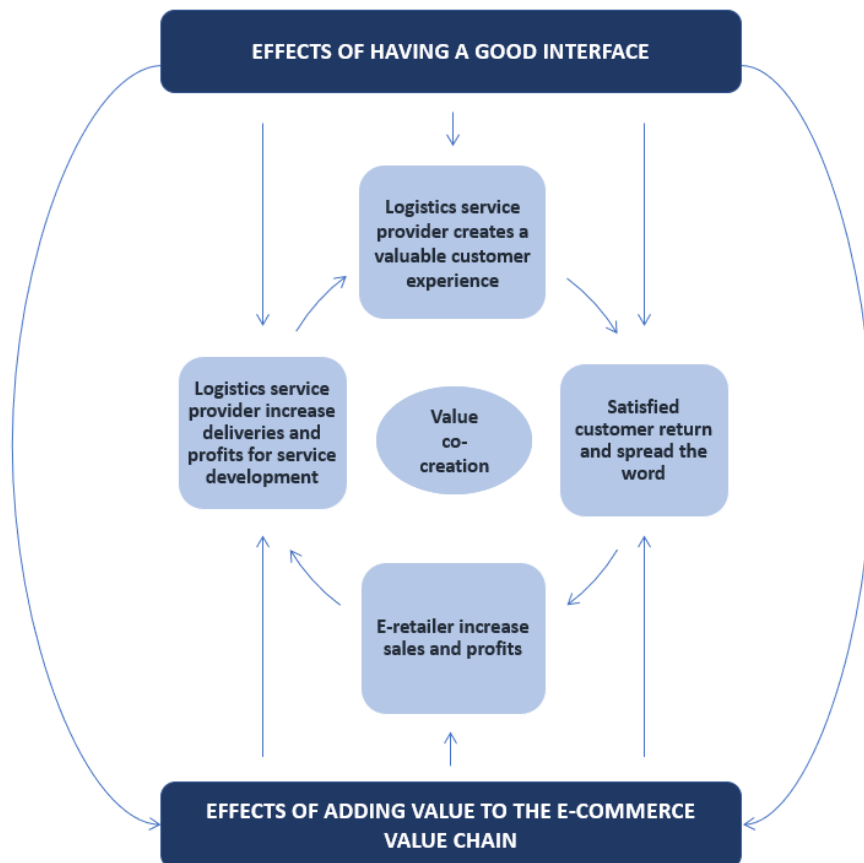
One way to continuously evaluate the interface, the physical interactions, and the service quality is by collecting customer feedback. As described from several of the interviews, the customer preferences are changing rapidly. This is visualized in Table 3 (Section 2.5), based on the survey conducted by Postnord (2021) and supported in the paper by Birch-Jensen (2018). Birch-Jensen suggests that a way to proactively change the way you work to meet the changing demand is by actively working with customer feedback. This is also important from the S-D logic perspective, as the value is co-created by the logistics service provider and the customer. Hence, feedback that comes directly from the customer is crucial for improving the customer experience. The

efforts to improve the customer experience based on the changing customer needs can be seen in the way the logistics service providers use customer feedback to continuously evaluate the quality of their services. A common KPI used by several actors is NPS or equivalent measurements which are used by 70-80% of companies today according to BGC. The most common way the interviewed companies gather customer feedback is by sending out short surveys after conducting the delivery. The way they use and follow up on the feedback differ and some of the companies such as Company C conduct extensive follow-up on bad reviews by trying to call the dissatisfied customer while most other actors are content with only using the data from the surveys. The efforts of reaching out to the dissatisfied customers by Company C show clear ambition to act on the feedback to find the root cause of the flawed deliveries. The interviewed companies seem to work with customer feedback in accordance with the criteria presented by Fanderl, Neher and Pulodo (2016) to define systematic ways to use the feedback that is gathered.

One example of logistics service providers using the customer feedback to create incentives for the couriers to make a good impression on the customer is through the reward system used by LSP2 where the couriers that receive outstanding ratings are acknowledged. As BGC describes how retailers increasingly realize the importance of customer satisfaction as a tool to increase profitability, the added costs tied to the delivery of e-commerce can be justified by the increased savings of creating satisfied customers explained by Subhashini and Hemamalini (2016). The importance of e-commerce actors investing in customer loyalty is further warranted by the low switching costs for customers when shopping online. As the same product is often found on several retailer's websites, the retailers need to map the customer journeys to find what aspects of the interface with the customer that makes a customer leave in favour of a competing actor. The same applies to the logistics service providers, who need to continuously make sure that the delivery times, delivery windows, cost, and other aspects of the delivery are acceptable and satisfactory to the customers in order to stop them from switching to a competing actor. As described by Gallo (2014), the reduced cost of sustaining the current customers will create significant cost savings.

### 5.3 Aspects of value co-creation

When discussing the two research questions, it was found that the answers are intertwined in several ways as they both describe different aspects of value co-creation. To visualize the connection, Figure 6 was designed to show the connection between logistics service providers generating a valuable customer experience, satisfied customers returning to the retailer and increasing awareness, e-retailers increasing sales and profits, and logistics service providers increasing sales and profits allowing them to further develop their services to increase customer value. The research questions involve two different aspects of value co-creation, the first one regarding logistics service providers and e-retailer who create value offered in the e-commerce value chain, and the second aspect is the value co-creation between logistics service providers and the end customer through the interaction of the delivery. These findings correlate with the findings of Wang et al. (2019), describing the value co-creation of the triadic relationship consisting of e-retailers, logistics service providers, and the end customer.



**Figure 6.** Describing the connection between the two research questions and the value co-creation between the stakeholders in the e-commerce value chain.

## 6. Conclusion

This chapter is divided into three sections where the first section provides the reader with a summary of the most prominent findings of the research and the answers to the research questions of the report. The second section discusses the research contributions of the report while the third section presents suggestions for future research related to the aim of the report.

---

### 6.1 Answering the research questions

*In what ways do last-mile delivery solutions offered by logistics actors add value to the e-commerce value chain?*

The general consensus of all literature and the empirical findings is that customer *convenience* is the most value-adding and largest contributing factor behind both the growth in the e-commerce sector and the innovation in last-mile logistics that we have seen in the past decade. Convenience in the form of last-mile delivery solutions is undefined in theory, but the findings in this report show that aspects such as *the availability of different delivery solutions that suits the specific circumstances of each order, the ability to change the delivery method, delivery time, and how close to the home the delivery is made*, are all contributing to the convenience and perceived value of the delivery. The last-mile delivery and returns process of e-commerce products should be simple and demand as little effort from the customer as possible. Furthermore, the innovative technological features that logistics actors provide to last-mile logistics and the e-commerce sector are regarded as valuable for the e-commerce customer to some extent. The sustainability of the delivery is described as value-adding in the literature and is supported in the interviews where the demand for sustainable deliveries was described to grow rapidly. It was found that the customer's willingness to pay is low and that they expect the logistics service provider to cover the added costs associated with transforming to sustainable deliveries. The last-mile delivery solutions improve the e-commerce value chain by enabling the retailer to focus all their efforts on their core capabilities while catering to the varying customer needs and preferences by offering a range of different solutions. The combined efforts of the e-retailer and the logistics service provider creates a valuable market offering by combining their different capabilities, resulting in competitive advantage.

*According to logistics actors, what aspects of the customer interaction with the logistics service provider contribute most to a valuable customer experience?*

When trying to find the most impactful aspects of the interface for creating a good customer experience, no single aspect emerged as the most important one. It was instead found that different aspects of the interface were important to different customers. There were however some aspects that were reoccurring in the empirical findings, such as the ability to trace the incoming delivery and how the courier presented themselves when interacting with the customer. It was also found that the logistics service providers believed that offering a unique and wide range of delivery

options was seen as a strong contributing factor to the customer experience. The functionality and simplicity of the solutions were prioritized while aspects such as the visual design of the solutions were seen as less important.

All the interviewed companies believed that the value of different aspects of the customer interaction is dynamic and that continuous development and tracking of customer experience using feedback is crucial to continuously improve the aspects that are not meeting the expectations of the customer.

## **6.2 Research contributions**

The value-adding aspects of last-mile logistics in the e-commerce landscape is important for all companies related to these activities. The findings cohere to some extent to the previous research but the thesis investigates areas that are not very well-grounded in theory and hence contributes on an understanding of the current state of the sector. As the thesis was written during the COVID-19 pandemic, it contributes with valuable implications of the effect of the pandemic on the sector. Furthermore, the thesis provides a unique set of perspectives, both of the Swedish last-mile logistics sector and by incorporating the perspective of other stakeholders related to the sector.

## **6.3 Suggestions for future research**

As this study has focused on the perspective of the logistics service provider, future research could investigate the customer- and e-retailer perspective of the last-mile solutions and their interface. This could be performed by conducting a survey asking e-commerce customers and e-retailers what aspects of the solutions create the most value. These findings could be compared to the views of the logistics service providers to find gaps in the service offerings and possible improvements of the last-mile logistics solutions and their interface. Combining the three perspectives could be used to better explain the dynamics of the triadic relationship between the e-retailer, the logistics service provider, and the end customer.

## References

Allen, J., Thorne, G., & Browne, M. (2007). BESTUFS good practice guide on urban freight transport.

Allhorn, J., *E-handlarna från 90-talet om de första stegen*. Retrieved from: <https://www.ehandel.se/E-handlarna-fran-90-talet-om-de-forsta-stegen,9917.html>

Baxendale, S., Macdonald, E. K., & Wilson, H. N. (2015). The impact of different touchpoints on brand consideration. *Journal of Retailing*, 91(2), 235-253.

Bergmann, F. M., Wagner, S. M., & Winkenbach, M. (2020). Integrating first-mile pickup and last-mile delivery on shared vehicle routes for efficient urban e-commerce distribution. *Transportation Research Part B: Methodological*, 131, 26-62.

Birch-Jensen, A. (2018). *Are You Really Listening to what Your Customers are Saying?: Making Use of Customer Feedback in the Era of Servitization and Digitalization* (Doctoral dissertation, Chalmers University of Technology).

Björklund, M., & Paulsson, U. (2014). *Academic papers and theses: to write and present and to act as an opponent*. Studentlitteratur.

Blackburn, J. D., Guide Jr, V. D. R., Souza, G. C., & Van Wassenhove, L. N. (2004). Reverse supply chains for commercial returns. *California management review*, 46(2), 6-22.

Bryman, A. and Bell, E. (2015) *Business Research Methods*, 4th ed. Oxford: OUP Oxford.

Cullinane, S., Browne, M., Karlsson, E., & Wang, Y. (2019). Retail clothing returns: A review of key issues. *Contemporary Operations and Logistics*, 301-322.

de Kervenoael, R., Schwob, A., & Chandra, C. (2020). E-retailers and the engagement of delivery workers in urban last-mile delivery for sustainable logistics value creation: Leveraging legitimate concerns under time-based marketing promise. *Journal of Retailing and Consumer Services*, 54, 102016.

Denscombe, M. (2017). *The good research guide : for small-scale social research projects* (Sixth edition.). Open University Press.

de Oliveira, L. K., Morganti, E., Dabanc, L., & de Oliveira, R. L. M. (2017). Analysis of the potential demand of automated delivery stations for e-commerce deliveries in Belo Horizonte, Brazil. *Research in Transportation Economics*, 65, 34-43.

DHL (2021). *Make a safe place for parcel collection*. Retrieved from: <https://send.dhlparcel.co.uk/resources/how-to-make-your-safe-place-safe>

eMarketer (2021a). *Worldwide e-commerce will approach \$5 trillion this year*. Retrieved from:

<https://www.emarketer.com/content/worldwide-e-commerce-will-approach-5-trillion-this-year>

eMarketer (2021b). *Global e-commerce update 2021*. Retrieved from: <https://www.emarketer.com/content/global-e-commerce-update-2021>

European Commission, Directorate-General for Health and Consumers (2012). Consumers conditions scoreboard. Luxembourg, Office for Official Publications of the European Union.

Eurostat (2021). E-commerce statistics for individuals. Retrieved from: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=E-commerce statistics for individuals](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=E-commerce_statistics_for_individuals)

Fanderl, H., Neher, K., & Pulido, A. (2016). Are you really listening to what your customers are saying. McKinsey & Company, 1-6.

Fridh, L. (2017). *Postnord ska leverera paket på kvällstid*. Retrieved from: <https://www.svt.se/nyheter/lokalt/skane/postnord-ska-leverera-paket-pa-kvallstid>

Gallo, A., (2014) *The Value of Keeping the Right Customers*. Harvard Business Review. Retrieved from: <https://hbr.org/2014/10/the-value-of-keeping-the-right-customers>

Gevaers, R., Van de Voorde, E., & Vanellander, T. (2011). Characteristics and typology of last-mile logistics from an innovation perspective in an urban context. *City Distribution and Urban Freight Transport: Multiple Perspectives*, Edward Elgar Publishing, 56-71.

Guthrie, C., Fosso-Wamba, S., & Arnaud, J. B. (2021). Online consumer resilience during a pandemic: An exploratory study of e-commerce behavior before, during and after a COVID-19 lockdown. *Journal of Retailing and Consumer Services*, 61, 102570.

Hallikainen, H., Alamäki, A., & Laukkanen, T. (2019). Individual preferences of digital touchpoints: A latent class analysis. *Journal of Retailing and Consumer Services*, 50, 386-393.

Hjort, K. (2013). *On aligning returns management with the E-commerce strategy to increase effectiveness* (Doctoral dissertation, Chalmers University of Technology; University of Borås).

Ignat, B., & Chankov, S. (2020). *Do e-commerce customers change their preferred last-mile delivery based on its sustainability impact?*. The International Journal of Logistics Management.

Jacobsen, D. I. (2002). *Vad, hur och varför: om metodval i företagsekonomi och andra samhällsvetenskapliga ämnen*. Lund: Studentlitteratur, 2002.

- Jaller, M., & Pahwa, A. (2020). *Evaluating the environmental impacts of online shopping: A behavioral and transportation approach*. Transportation Research Part D: Transport and Environment, 80, 102223.
- Joerss, M., Schröder, J., Neuhaus, F., Klink, C., & Mann, F. (2016). Parcel delivery: The future of last-mile. *McKinsey & Company*, 1-32.
- Khan, A. G. (2016). Electronic commerce: A study on benefits and challenges in an emerging economy. *Global Journal of Management and Business Research*.
- Kjellsdotter Ivert, L., Kalantari, J., Hiselius, L., Henriksson, P., & Karlsson, J. (2020). *Energieffektiv distribution av dagligvaror vid ökad e-handel genom transporteffektiv logistik och minskade bilresor*.
- Konkurrensverket. (2018). Konkurrensen i Sverige 2018. Kapitel 8: Paketmarknaden. Retrieved from: [https://www.konkurrensverket.se/globalassets/publikationer/rapporter/rapport\\_2018-1\\_kap8-paketmarknaden.pdf](https://www.konkurrensverket.se/globalassets/publikationer/rapporter/rapport_2018-1_kap8-paketmarknaden.pdf)
- Kraljic, P. (1983). Purchasing must become supply management. *Harvard business review*, 61(5), 109-117.
- Laghaei, J., Faghri, A., & Li, M. (2016). Impacts of home shopping on vehicle operations and greenhouse gas emissions: multi-year regional study. *International Journal of Sustainable Development & World Ecology*, 23(5), 381-391.
- Lambert, D. M., & Cooper, M. C. (2000). Issues in supply chain management. *Industrial marketing management*, 29(1), 65-83.
- Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of marketing*, 80(6), 69-96.
- Lim, S. F. W., Jin, X., & Srai, J. S. (2018). Consumer-driven e-commerce: A literature review, design framework, and research agenda on last-mile logistics models. *International Journal of Physical Distribution & Logistics Management*.
- Nel, J. D., & Badenhorst, A. (2020). A conceptual framework for reverse logistics challenges in e-commerce. *International Journal of Business Performance Management*, 21(1-2), 114-131.
- NETS. (2021). Svensk e-handel 2020. Retrieved from: <https://info.nets.se/svensk-ehandel-2020>
- Park, M. and Regan, A. (2004) 'Issues in emerging home delivery operations', Research Paper, University of California, Institute of Transportation studies, [www.uctc.net](http://www.uctc.net).
- PTS. (2020). *Svensk postmarknad 2020* (PTS-ER-2020:10). Retrieved from: <https://www.pts.se/globalassets/startpage/dokument/icke-legala-dokument/rapporter/2020/post/svensk-postmarknad-2020.pdf>



- Postnord. (2020a). E- Barometern årsrapport 2019. Retrieved from:  
<https://dhandel.se/wp-content/uploads/2020/02/e-barometern-arsrapport-2019.pdf>
- Postnord. (2020b). E-barometern Q1 2020. Retrieved from:  
<https://media.dhandel.se/wl/?id=e0vK48t5GPkCMLpVzvUdhZbG0gUeaKa7>
- Postnord. (2020c). E-commerce in Europe 2020. Retrieved from:  
<https://www.postnord.com/siteassets/documents/media/publications/e-commerce-in-europe-2020.pdf>
- Postnord. (2021). *E- Barometern årsrapport 2020*. Retrieved from:  
<https://www.postnord.se/vara-losningar/e-handel/e-handelsrapporter/e-barometern>
- PWC. (2020). *Nordic consumer trends: Covid-19, where next? How to stay relevant and resilient in a supercharged shift to online*. Retrieved from:  
<https://www.strategyand.pwc.com/n1/en/media/pdf/Nordic-consumer-trends-2020.pdf>
- Reichheld, F. (2001). *Prescription for cutting costs*. Bain & Company. Boston: Harvard Business School Publishing.
- Rice, J. B., & Hoppe, R. M. (2001). *Supply chain vs. supply chain: The hype and the reality*. Supply Chain Management Review, v. 5, no. 5 (sept./oct. 2001), p. 46-54: ill.
- Saunders, M., Lewis, P., & Thornhill, A. (2015). *Research Methods for Business Students* (7.ed.). New York, NY: Pearson Education Limited.
- Subhashini, S. & Hemamalini, K.. (2016). An Empirical Study on the Drivers of E-Commerce Business. Indian Journal of Science and Technology. 9. 10.17485/ijst/2016/v9i32/98648.
- Slabinac, M. (2015). *Innovative solutions for a “Last-Mile” delivery—a European experience*. Business Logistics in Modern Management.
- Tax, S. S., McCutcheon, D., & Wilkinson, I. F. (2013). The service delivery network (SDN) a customer-centric perspective of the customer journey. *Journal of Service Research*, 16(4), 454-470.
- United Nations, 2018. *World Urbanization Prospects: The 2018 Revision*. Technical Report. United Nations Population Division. URL: <https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html>
- Vakulenko, Y., Shams, P., Hellström, D., & Hjort, K. (2019). Service innovation in e-commerce last-mile delivery: Mapping the e-customer journey. *Journal of Business Research*, 101, 461-468.
- Veldman, R. (2019). *Light electric freight vehicles in last-mile delivery* (Doctoral dissertation, Massachusetts Institute of Technology).

Visser, J., Nemoto, T., & Browne, M. (2014). Home delivery and the impacts on urban freight transport: A review. *Procedia-social and behavioral sciences*, 125, 15-27.

Viu-Roig, M., & Alvarez-Palau, E. J. (2020). The Impact of E-Commerce-Related Last-Mile Logistics on Cities: A Systematic Literature Review. *Sustainability*, 12(16), 6492.

Wang, X., Yuen, K. F., Wong, Y. D., & Teo, C. C. (2019). Consumer participation in last-mile logistics service: an investigation on cognitions and affects. *International Journal of Physical Distribution & Logistics Management*.

World Economic Forum. (2020). *The Future of the Last-Mile Ecosystem*. Retrieved from: [http://www3.weforum.org/docs/WEF\\_Future\\_of\\_the\\_last\\_mile\\_ecosystem.pdf](http://www3.weforum.org/docs/WEF_Future_of_the_last_mile_ecosystem.pdf)

Xiao, Z., Wang, J. J., & Liu, Q. (2018). The impacts of final delivery solutions on e-shopping usage behaviour: The case of Shenzhen, China. *International Journal of Retail & Distribution Management*.

Xu, M., Ferrand, B., & Roberts, M. (2008). The last mile of e-commerce—unattended delivery from the consumers and eTailers' perspectives. *International Journal of Electronic Marketing and Retailing*, 2(1), 20-38.

Yazdanparast, A., Manuj, I., & Swartz, S. M. (2010). Co-creating logistics value: a service-dominant logic perspective. *The International Journal of Logistics Management*.

Yuen, K. F., Wang, X., Ng, L. T. W., & Wong, Y. D. (2018). An investigation of customers' intention to use self-collection services for last-mile delivery. *Transport Policy*, 66, 1-8.

Zacharia, Z. G., Sanders, N. R., & Nix, N. W. (2011). The emerging role of the third-party logistics provider (3PL) as an orchestrator. *Journal of business logistics*, 32(1), 40-54.

# Appendices

Appendix I - Interview guide

## Appendix I - Interview guide

A description of the interview process.

Before the actual interview started, the authors provided the interviewee with a description of the study and what type of subject areas will be included in the questions. On request, the interviewee was given some of the questions to answer in text prior to the interview to give room for discussion regarding the answers.

The interviews were divided into subject areas to structure the findings. Originating from the subject areas, interview questions were formulated based on the company and the expected competencies of each interviewee. The subject areas were:

- E-commerce development
- Interaction and Interface
- Customer experience
- Customer feedback
- Last-mile delivery development
- Role of the logistics service provider
- Delivery options
- Returns
- Sustainability

Before the interview questions related to the subject areas were brought up. The interviewee was asked to describe their professional history and what aspects of the logistics industry they had experience in. The interviewees were also asked for how long they had been at the current company and at what positions they had worked.





**CHALMERS**  
UNIVERSITY OF TECHNOLOGY