# Exploring Environmentally Sustainable Last-Mile Deliveries in Sweden

A Qualitative Study on Why and How E-retailers Offer Environmentally Sustainable Last-Mile Delivery Options


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# Abstract

Last-mile delivery is the part of the e-commerce supply chain that is the least efficient in terms of cost, time, and environmental impact. As e-commerce is expected to keep growing, this puts pressure on last-mile deliveries to reduce their environmental impact if Sweden is to reach its environmental goals for 2045. E-retailers in Sweden are offering their customers a selection of last-mile delivery options, and there is frequent use of sustainability terms (e.g., *fossil-free, environmentally friendly)* to advertise different options. However, the meaning of these terms seems to not always correlate with the actual environmental impact of the last-mile delivery. This risks creating miscommunication between e-retailers, customers, and logistic service providers, which can lead to confusion and legal implications. The area is still unexplored, and there is limited research on the subject.

The purpose of this thesis was therefore to explore if, how, and why Swedish e-retailers offer environmentally sustainable last-mile deliveries. It was studied with regard to how it is communicated and prioritized in company decisions and which factors affect this. This was explored through a qualitative, exploratory interview study with six of the biggest e-retailers in Sweden. A mapping of the 100 biggest Swedish e-retailers' delivery options was made to get an overview of the current situation.

The analysis of data from interviews, the mapping, and the literature study was made to understand the factors that influence e-retailers' decisions on offering and communicating environmentally sustainable last-mile deliveries. These factors were: lack of knowledge, terminology, no comparable measurement for $CO_2$, fear of greenwashing, and the competitive aspect. The e-retailers' general views on sustainability work were also analyzed. From the analysis, eight propositions were created on how to overcome the current challenges that were detected. These propositions were then grouped into three categories: company priorities, validation, and industry collaboration.

Given the gaps in the area, there is a belief that the results and analysis highlighted in this thesis have practical as well as theoretical contributions to the entire e-commerce industry. The thesis has also provided propositions for how e-retailers can move forward to work more transparently with the environmental impact of the last-mile delivery options they are offering. Hence, the thesis can act as a starting point for future research where it would be beneficial to deep dive into awareness programs, the need for regulations, and the environmental aspect of purchasing goods from e-retailers versus from a physical store.

This thesis has been a complete elaboration between the two authors. Each author has been involved in every part of the process and contributed equally.

**Keywords:** *Last-mile delivery, E-retailer, Sustainable last-mile delivery, Environmentally sustainable last-mile delivery*

# Sammanfattning

Sista milen-leveranser är den delen av e-handelns försörjningskedja som är minst effektiv när det gäller kostnad, tid och miljöpåverkan. Med tanke på att e-handeln förväntas fortsätta växa och ifall Sverige ska nå sina miljömål till år 2045, så behövs press sättas på sista milen-leveranserna för att minska deras miljöpåverkan. E-handlare i Sverige erbjuder sina kunder ett urval av leveransalternativ och det finns en frekvent användning av hållbarhetstermer (e.g., *fossilfri, miljövänlig*) för att marknadsföra de olika alternativen. Innebörden av dessa termer verkar inte alltid korrelera med den faktiska miljöpåverkan från sista milen-leveranserna. Detta riskerar att skapa felaktig kommunikation mellan e-handlare, kunder och leverantörer av logistiktjänster, vilket kan leda till förvirring och juridiska konsekvenser. Området är fortfarande outforskat och det finns begränsad forskning i ämnet.

Syftet med detta examensarbete var därför att undersöka om, hur och varför svenska e-handlare erbjuder miljömässigt hållbara sista milen-leveranser. Det studerades med avseende på hur det kommuniceras och prioriterades i företagsbeslut, men även vilka faktorer som påverkar och avgör beslutet om att erbjuda och kommunicera miljömässigt hållbara leveransalternativ. Detta undersöktes genom en kvalitativ och utforskande intervjustudie med sex av de största e-handlarna i Sverige. Även en kartläggning av de 100 största svenska e-handlarnas leveransalternativ gjordes för att få en överblick över nuläget.

Dataanalysen från intervjuerna, kartläggningen och litteraturstudien gjordes för att förstå de faktorer som påverkar e-handlares beslut om att erbjuda miljömässigt hållbara sista milen-leveranser. Dessa faktorer var: bristande kunskap, terminologi, inga jämförbara mätningar för $CO_2$, rädsla för greenwashing och aspekten om konkurrens. Även e-handlarnas allmänna syn på hållbarhetsarbete analyserades. Utifrån analysen skapades åtta förslag om hur de aktuella problem som upptäcktes skulle hanteras. Dessa förslag grupperades slutligen i tre kategorier: prioritering för företag, validering och branschsamarbete.

Med tanke på att området är outforskat, så finns det en uppfattning om att avhandlingens resultat och analys har praktiska såväl teoretiska bidrag till hela e-handelsbranschen. Avhandlingen har också gett förslag på hur e-handlare kan gå vidare för att arbeta mer transparent med miljöpåverkan för de leveransalternativ som de erbjuder. Därför kan avhandlingen fungera som en utgångspunkt för framtida forskning, där det skulle vara fördelaktigt att djupdyka i program för att öka medvetenheten om ämnet, om det finns behov av regelverk och undersöka miljöaspekterna av att köpa varor från e-handlare kontra från en fysisk butik.

Detta examensarbete är resultatet av ett samarbete mellan författarna. Båda författarna har varit med i alla delar i processen och bidragit till lika delar.

**Sökord:** *Sista milen-leveranser, E-handlare, Hållbara sista milen-leveranser, Miljömässigt hållbara sista milen-leveranser*

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# List of Abbreviations

| | |
|---|---|
| **B2B** | Business to business |
| **B2C** | Business to customer |
| **C2C** | Customer to customer |
| **CO2** | Carbon dioxide |
| **GHG** | Greenhouse gas |
| **HDV** | Heavy-duty vehicle |
| **LDV** | Light-duty vehicle |
| **LSP** | Logistics service provider |

# 1. Introduction

In 2017, it was announced that Sweden would have a long-term goal for reducing greenhouse gas emissions. The goal meant that in 2045, Sweden should have no net emissions of greenhouse gases into the atmosphere and thereafter only achieve negative emissions. To be able to cope with this, stage targets were created within, among other things, the transport sector, where emissions from all domestic transport, apart from air transport, have to be reduced by 70% by 2030 at the latest (Regeringskansliet, 2017; Naturvårdsverket, n.d.). At the same time, there is an ambition from the Government Office for Sweden to become a fossil-free welfare country, where future generations will not have to deal with today's environmental problems (Regeringskansliet, 2018). The Swedish Environmental Protection Agency (2023), together with other governmental bodies, assessed at the beginning of 2022 that it would be possible to meet the stage targets for emissions from domestic transport for 2030 with the policy instruments decided up to March 2022. However, the current Government Office for Sweden expects net emissions for the coming years to be greater than the predicted amount, based on the budget proposal for 2023 (Naturvårdsverket, 2023). If the long-term goal and ambition are to become a reality, then the transition within the transport and delivery sector needs to be intensified.

One area where the transition within the transport and delivery sector can be intensified is e-commerce. E-commerce had a strong growth rate of 40% in 2020, and the biggest contributing factor to the growth was COVID-19 (Postnord, 2022). During the same year, the disease was classified as a pandemic, which resulted, among other things, in customers being asked to slow down the increased spread of infection by avoiding shopping centers and stores (Public Health Authority, 2020). The result of this, together with the ongoing technological development, was that more customers turned to e-retailers (Postnord, 2022; Corejova et al., 2022). E-commerce is the most widespread form of commerce, and it is also expected to become the main sales strategy for both wholesalers and stores in the near future (Corejova et al., 2022). The definition of e-commerce is that it is an electronic distance trade of services and goods that takes place over the Internet. Trades can take place between B2B (i.e., business to business), B2C (i.e., business to customer), or C2C (i.e., customer to customer) (Cambridge University (1), n.d.; Nationalencyklopedin, n.d.). What differentiates e-commerce from in-store commerce is last-mile deliveries, which are deliveries from the warehouse or store to the end customer and constitute the last step in the distribution chain (Corejova et al., 2022).

The goal of last-mile deliveries is to deliver goods to each customer, and to be able to carry this out smoothly, high demands are placed on the supply chain. Above all, the requirements are high when the market is highly competitive and there is a large proportion of competitors within last-mile distribution (Allen et al., 2018). Thus, the focus for e-retailers is to increase customer satisfaction and loyalty (Strenitzerová & Gaňa 2018; Corejova et al., 2022) by meeting customer demand for convenience, speed, and flexibility in last-mile deliveries (Kjellsdotter Ivert et al., 2020; Oláh et al., 2018; Gruchmann, Melkonyan & Krumme, 2018).

As a result of the high focus on customer satisfaction, last-mile deliveries are the part of the entire delivery process that has the highest costs and is the least efficient. The reason for this is mainly the large spread of different delivery destinations, the low fill rate in the transports, and the high level of service that needs to be achieved (Corejova et al., 2022). The increase in costs is due to the large variety of deliveries, as the companies can offer deliveries to postal agents and stores, as well as home deliveries and express deliveries (Postnord, 2022). The increased use of transport vehicles contributes to a negative climate impact through increased emissions of greenhouse gases (Kjellsdotter invert et al., 2020). Hence, the last-mile delivery is the least sustainable part of the distribution chain (Brown & Guiffrida, 2014; Kjellsdotter Ivert et al., 2020; Oláh et al., 2018; Gruchmann, Melkonyan & Krumme, 2018).

There is a high probability that rules and/or laws will be introduced that prevent companies from working unsustainably and not offering the customer environmentally sustainable transport. The customers, in turn, can influence whether the delivery method should be sustainable or not, but as a customer, it can be difficult to assess the climate impact of the various delivery options (Buldeo Rai, Verlinde & Macharis (1), 2018; Young et al., 2010). E-retailers offer limited information about both the consequences of each delivery choice and the terminology that is being used (Buldeo Rai, Verlinde & Macharis (1), 2018; Young et al., 2010; Lurell et al., 2018; Ignat & Chankov, 2020), which means that words like *"Fossil-free"* and *"Climate-smart"* can mean different things depending on the company (Schmuck, Matthes & Naderer, 2018). For example, a delivery option can be called *"Fossil-free"* if the entire delivery from a Swedish warehouse is fossil-free, while other cases refer to fossil-free only during the last-mile delivery.

The lack of information is the factor that most influences customers' choice in last-mile delivery (Young et al., 2010; Buldeo Rai, Verlinde & Macharis (1), 2018; Lurell et al., 2018; Ignat & Chankov, 2020) and due to the terminology not being used systematically, confusion can easily arise among customers. A survey that was made by Nordic Swan Ecolabel and The Swedish Retail Institute on behalf of Transport Analysis showed that 52% of the respondents stated that they do not know what environmentally friendly delivery options mean. Despite this, 4 out of 10 would still choose a more environmentally sustainable delivery. Furthermore, of all the terms (i.e., *fossil-free, climate-smart, climate-compensated, climate-neutral,* and *environmentally friendly*) that are generally used by e-retailers today to describe a sustainable delivery, the term *"Fossil-free*" is stated to be the most understandable term. However, around 30% of the respondents considered the terms *"Fossil-free"* and *"Environmentally friendly"* to be incomprehensible, and more than 40% perceived the other terms (i.e., *climate-smart, climate-compensated,* and *climate-neutral*) as incomprehensible (Trafikanalys (1), 2022). Considering this, the information about different sustainable delivery options is insufficient, and the result from the survey indicates that the lack of information makes it difficult for the customer to know which delivery option is sustainable. The combination of insufficient information and the confusion among the different terms that are being used, as well as the increasing growth of e-retailers, shows the need for further research on what defines an environmentally sustainable delivery method, which factors affect e-retailers' decisions to offer

environmentally sustainable deliveries, and the challenges and opportunities for e-retailers to offer and communicate environmentally sustainable last-mile deliveries.

## 1.1 Purpose and Intended Contribution

This study aims to investigate the phenomenon of why and how e-retailers offer environmentally sustainable last-mile delivery options.

The essay should contribute further knowledge of logistics in general, as the field undergoes constant change and the sustainability perspective is an important topic of discussion in today's situation. The emergence of e-commerce is expected to grow significantly in the future, and sustainable delivery options in e-commerce are becoming an increasingly important challenge for society to deal with. Therefore, this thesis intends to contribute important aspects to the whole e-commerce sector on what e-retailers should have in mind when offering and communicating environmentally sustainable last-mile deliveries.

## 1.2 Research Questions

The following research questions form the basis of the thesis:

**RQ1:** How can environmentally sustainable last-mile deliveries be defined?

A literature review will be conducted to find the answer to this question. Definitions, types of last-mile deliveries, and their environmental impact will be studied in the relevant literature.

**RQ2:** Which sustainable last-mile delivery options are offered by e-retailers today, and which factors affect this decision?

The top 100 e-retailers in Sweden will be mapped according to the last-mile delivery options they offer. The mapping will give a depiction of how sustainable last-mile deliveries are in Sweden today and which e-retailers offer sustainable last-mile delivery options. The factors will be outlined from the literature review, and potential underlying reasons for the emergence of the factors will be answered by combining the empirics with the analysis.

**RQ3:** What challenges and opportunities are there for e-retailers to offer and communicate environmentally sustainable last-mile deliveries?

This question will be answered by combining the analysis of data collected in semi-structured interviews conducted with companies of interest, chosen from the mapping, with the literature review.

## 1.3 Focus and Limitations

The thesis is primarily about investigating the challenges and opportunities related to e-retailers' decisions on offering and communicating environmentally sustainable last-mile deliveries. Sustainable development includes social, environmental, and economic sustainability (Glavas & Mish, 2015; Laurell et al., 2018; Oláh et al., 2018). This thesis will only study environmental sustainability and last-mile deliveries in the urban area of Lund will primarily be in focus. Furthermore, the concept of sustainable delivery options includes transport that has a minimal climate impact during last-mile deliveries (e.g., fossil-free vehicles and electric vehicles). Swedish freight transport will mainly be in focus, but international examples will occur. This is mainly to further support the claims being made.

Work environment issues will not be addressed in the thesis, nor will e-commerce of services and non-material products (e.g., travel, e-books, and tickets). Furthermore, the thesis will not cover the transport and e-commerce of daily goods, only material package deliveries from the e-commerce warehouse to customers (i.e., last-mile deliveries). It is also in this section of the supply chain that customers have the greatest opportunity to influence their choices. E-retailers who have omni-channels will also be excluded from this thesis.

The limitations above are dependent on our method as well as our analysis approach. The primary method for the data collection was the mapping of the largest e-retailers in Sweden, which served as the basis for our semi-structured interviews. This given format made us cover all the areas of factors that influence given information about sustainable last-mile deliveries, which impact e-retailers' decisions on offering and communicating environmentally sustainable last-mile delivery options. However, the challenge with a qualitative study is that the importance of the different factors that influence the most and the least on the decision on sustainable last-mile deliveries cannot be set or compared based on the different opinions of the participating respondents. Even though the limitations of the study exist, the choice of the chosen method was necessary given the explorative deep dive into the area. The factors that influenced the decision were built on limited and recent research, which indicates that this area is still unexplored, and more research is required. Consequently, we believe that the methodological choice and analysis approach provided an understanding of the phenomenon of why and how e-retailers offer sustainable last-mile delivery options.

## 1.4 Thesis Structure

The thesis consists of six chapters; each chapter corresponds to a research phase. The phases and their main outputs are illustrated in Figure 1.1 below. In **Chapter 1 Introduction,** the problem definition, purpose, and intended contribution, research questions, and focus and limitations have been covered.

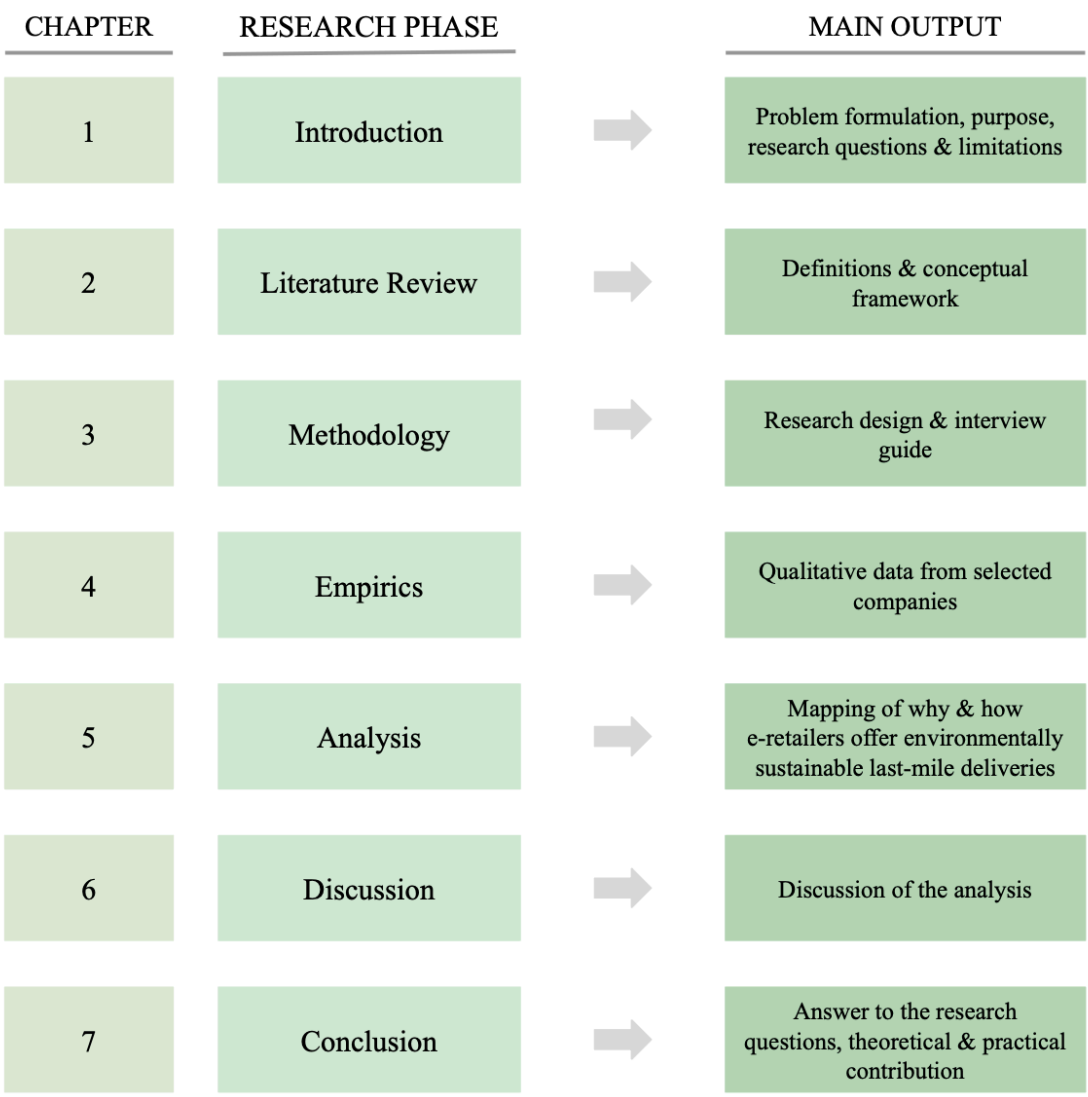


***Figure 1.1:*** *The structure of the thesis with chapters and their respective research phases and main outputs.*

In **Chapter 2 Literature Review,** the central concepts of the thesis are defined, different types of last-mile deliveries and their environmental impact are described, and lastly, a theoretical framework is presented.

In **Chapter 3 Methodology,** the research approach and design are presented, and the process of mapping e-retailers is described. The interview guide is introduced and discussed, as is how the gathered interview data will later be handled and analyzed. Lastly, this chapter discusses the ethics, credibility, and validity of the method.

In **Chapter 4 Empirics,** the qualitative data from the mapping and interviews are presented.

In **Chapter 5 Analysis,** the data from Chapter 4 is interpreted and analyzed with the data from Chapter 2. From the data, factors as to why and how companies offer sustainable last-mile

deliveries are identified. Based on this, propositions are formed with opportunities to overcome the identified challenges.

In **Chapter 6 Discussion,** a discussion of the analysis will be presented. The discussion will include possible alternative interpretations of the results and whether they can be generalized to other contexts.

In **Chapter 7 Conclusion,** the answers to the research questions are presented. The theoretical and practical contributions of the findings are also discussed.

# 2. Literature Review

*To give the reader an insight into the relevance of the study in the context of sustainable last-mile delivery, this chapter will clarify concepts and definitions that are relevant to the research topic. Hence, the literature review will be divided into four parts: last-mile delivery, the delivery options, the environmental impact of last-mile delivery, and the communication of sustainable last-mile delivery, see Figure 2.1. Lastly, all the findings will be summarized in a conceptual framework.*

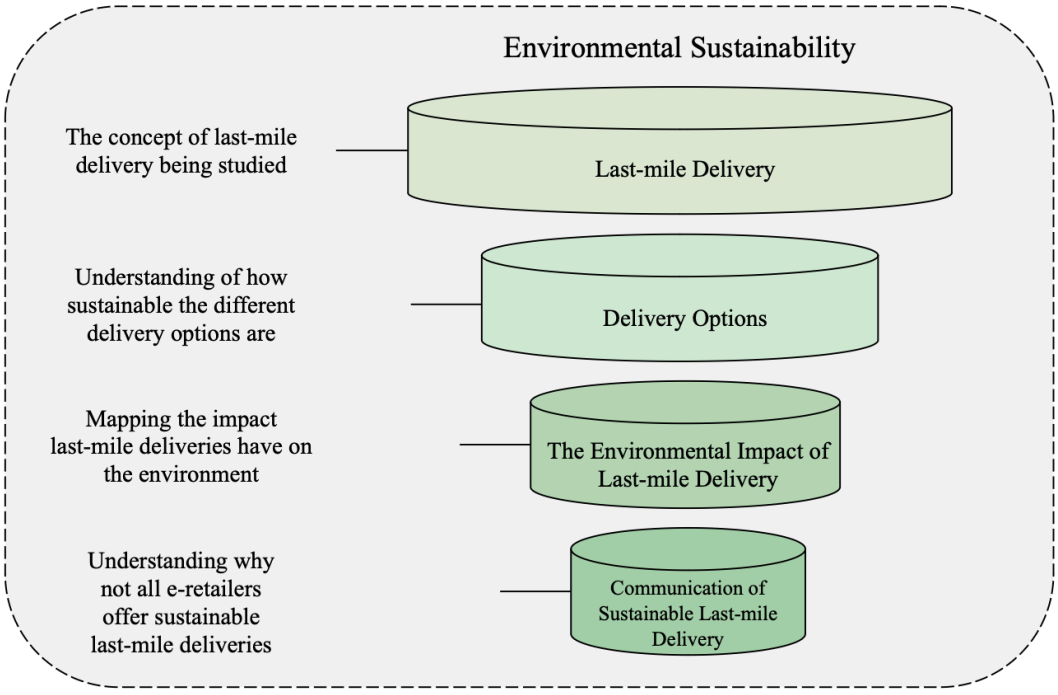


***Figure 2.1:*** *The theoretical building blocks of the literature review.*

## 2.1 Common Terms Used for Sustainable Deliveries

To further elaborate on last-mile deliveries regarding sustainability, the definition of environmental sustainability and other terms that are commonly used to describe the environmental impact of last-mile deliveries will be discussed in this chapter.

One of the most commonly accepted definitions of sustainable development is the one stated in the 1987 United Nations Brundtland Commission (Alhaddi, 2015). They defined sustainable development as *"meeting the needs of the present without compromising the ability of future generations to meet their own needs"* (United Nations, 2023). Ten years later, the concept of the Triple Bottom Line was coined by Elkington, a concept that divided sustainability into three categories: people, planet, and profit (Alhaddi, 2015). This is also known as social, environmental, and economic sustainability. The Brundtland definition is thereby not specified for environmental sustainability but applicable for all three dimensions.

Environmental sustainability is defined by Morelli (2011) as *"meeting the resource and services needs of current and future generations without compromising the health of the ecosystems that provide them".* This definition is similar to the Brundtland definition but specifies the environmental aspect of sustainability, which is the impact on ecosystems. However, according to Fulton, Clarke, and Albán (2017), the full potential of the concept of sustainability is still restrained by the ambiguity of the term. They suggest the following definition of environmental sustainability: *"The avoidance, to the maximum practicable extent, of irreversible and irretrievable commitment of resources".* This definition puts more focus on the actual use of resources and the impacts and consequences it might lead to, and it is more specific than the Brundtland and Morelli definition. Fulton, Clarke, and Albán (2017), further argue that to meet the needs of the present, it might in some circumstances be necessary to use resources irreversibly and irretrievably, although it should be done in a way that preserves as much of the resources as possible for future generations.

Another factor contributing to the ambiguity of sustainability terminology is the vast number of terms and their corresponding meanings (Glavič & Lukman, 2007). They state that the number of terms within the field of sustainability has increased along with increased awareness of the subject. Different authors, organizations, and companies use different definitions of the same terms, which can lead to a confusing and elusive message to customers and other stakeholders. Some of these terms are *"Fossil-free", "Carbon offsetting", "Environmentally friendly"* and *"Climate-smart"*. The definition of the terms used in this thesis can be seen in Table 2.1.

A term that is commonly used in Sweden to promote the sustainability of a service is *"Fossil-free"*, which means the energy does not originate from fossil fuels such as coal, oil, and natural gas (Sveriges Allmännytta, 2023). It is not further defined what the energy is used for or in what scope, e.g., generating electricity or fuel for combustion engines. As an example of the mentioned difference in definitions, Instabox defines fossil-free as fuels that do not release any new carbon dioxide into the atmosphere (Instabox, 2023).

*"Carbon offsetting"* is another term that is commonly used in sustainability contexts. The concept of carbon offsetting is to reduce the number of emissions caused by one process by substituting the same amount in another process somewhere else (Naturskyddsföreningen, 2023). The reduction of emissions can be made through investments in projects like planting trees or the development of fossil-free fuels. Emission trading systems can also be used for this purpose.

*"Environmentally friendly"* is defined by the Cambridge Dictionary (2023) as "*not harmful to the environment or trying to help the environment"*. They further define harmful as *"physical or other injury or damage"*, which would imply that something environmentally friendly would cause no type of damage to the environment.

According to The Swedish Academy Dictionary (2015), *"Climate-smart"* is defined as the *"strive to counteract the deterioration of the climate*". The context of the customer perspective can imply that basing everyday-life decisions on the most environmentally friendly alternative.

***Table 2.1:*** *Summary of the common terms used for sustainable delivery and their definition in this thesis.*

| Term | Definition used in this thesis |
|---|---|
| Fossil-free | The energy used does not originate from fossil fuels (Sveriges Allmännytta, 2023). |
| Carbon offsetting | The reduction of emissions made in order to compensate with the same amount elsewhere (Naturskyddsföreningen, 2023). |
| Environmentally friendly | Not harmful to the environment (Cambridge Dictionary, 2023). |
| Climate-smart | Strive to counteract the deterioration of the climate (Svenska Akademiens ordlista, 2015). |

## 2.2 Last-Mile Delivery

The literature presents a wide range of themes regarding the concept of the last-mile, which indicates that the concept has a broader definition than the scope of a single discipline. Some authors mean that the last-mile includes both B2B and B2C transactions and is thus, not limited to only one of the two (Saenz, Figliozzi, & Faulin, 2016; Zhang et al., 2019; Brown & Guiffrida, 2014; Wollenburg et al., 2018). Whereas some authors limit last-mile to B2C transactions (Lim, Jin & Srai, 2018; Harrington et al., 2016; Xiao, Wang & Liu, 2018; Akeb, Moncef & Durand, 2018; Lin Zhou et al., 2019; Reyes, Savelsbergh, & Toriello, 2017). The different definitions of the last-mile concept led Olsson, Hellström & Pålsson (2019) develop a framework that addresses the various aspects of the concept of the last-mile that are found in the literature. As can be seen in Figure 2.2, the framework has identified five interrelated components: last-mile logistics, last-mile distribution, and the central components: last-mile fulfillment, last-mile transport, and last-mile delivery.

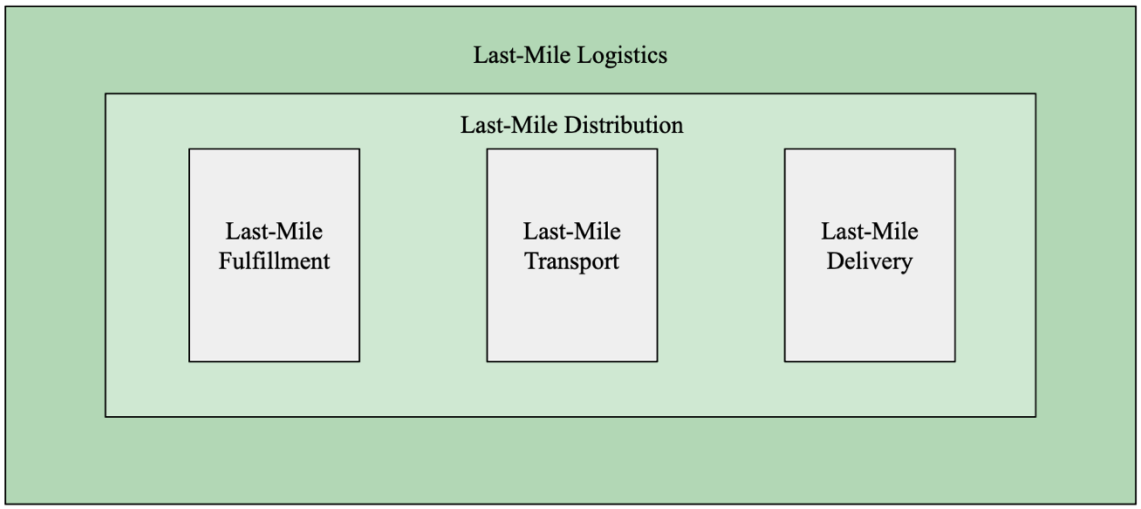


***Figure 2.2:*** *All components of the term last-mile. A framework developed by Olsson, Hellström & Pålsson (2019).*

The umbrella of the framework is last-mile logistics, which addresses strategic and long-term planning. It provides a holistic overview of the system and can be associated with the activities of planning, implementing, and controlling effectively, as well as the efficient storage and transportation of goods from the transportation hub to the final recipient. Subsequently, last-mile distribution is tactical with a mid-term planning horizon. It can be described as the storage, handling, and movement of goods through different channels. Finally, the core of the framework consists of three central components that are operational and have a short-term planning horizon. Last-mile fulfillment is the activity of fulfilling customers' orders by making them ready to be delivered. The second component is last-mile transport, which focuses more on the movement of goods, which can be done through different vehicles. Lastly, last-mile delivery is described as all of the tasks necessary to physically deliver the goods to the final destination point chosen by the customer (Olsson, Hellström & Pålsson, 2019). However, last-mile delivery has various definitions depending on the authors, see Table 2.2.

***Table 2.2:*** *Different definitions of last-mile delivery,*

| Authors | Definition of last-mile delivery |
|---|---|
| Harrington et al. (2016) | "The final component of a B2C delivery process. It takes place within a predefined urban system, with specific characteristics, and includes upstream logistics to the last transit point until the destination point of a delivery. It involves a series of activities and processes, of critical value to all the involved stakeholder groups, within an urban system." |
| Aized & Srai (2014) | "Last Mile refers to the last part of the physical goods delivery process which involves a set of activities that are necessary for the delivery process from the last transit point to the final drop point of the delivery chain." |
| Esper et al. (2003) | "The critical link between consumer-based Internet ordering and the delivery of the product to the consumer is often referred to as the final or last mile." |
| Gevaers, Van de Voorde & Vanelslander (2014) | "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." |
| Olsson, Hellström & Pålsson (2019) | "Last mile delivery refers to the activities necessary for physical delivery to the final destination chosen by the receiver." |
| Lim, Jin & Srai (2018) | "Last mile delivery is the last stretch of a business-to-consumer (B2C) parcel. It takes place from the order penetration point to the final consignee's preferred destination point for reception of goods." |

In this thesis, last-mile delivery will be defined as *the last segment of B2C delivery that takes place from the last transit point to a final consignee's preferred collection point* (Lim, Jin & Srai, 2018; Gevaers, Van de Voorde & Vanelslander, 2014; Harrington et al., 2016). Environmentally sustainable last-mile delivery will be defined as *the last segment of B2C delivery that takes place from the last transit point to a final consignee's preferred collection point and avoids, to the maximum practicable extent, the irreversible and irretrievable commitment of resources* (Lim, Jin & Srai, 2018; Gevaers, Van de Voorde & Vanelslander, 2014; Harrington et al., 2016; Fulton, Clarke & Albán, 2017).

The process of last-mile delivery is considered a crucial part of the whole delivery process (Esper et al., 2003) where the primary objective is to deliver parcels to customers as affordably, quickly, and accurately as possible. Resulting in a significant impact on the company and its customers since it is associated with various challenges of ineffective delivery. The inefficiency is linked to the spread of destination points, the scope of orders, and high goals for the service

level that is offered to the customers (Mangiaracina et al., 2015; Oláh et al., 2018; Gruchmann, Melkonyan & Krumme, 2018). The reason for this is to keep up with the increasing demand for fast delivery in retail and e-commerce. Furthermore, last-mile delivery is considered to be the most expensive part of the whole supply chain logistics and accounts for 41% of the total supply chain costs and 53% of the total shipping costs (World Economic Forum, 2020). If no interventions happen, there will be a 32% increase in carbon emissions from delivery traffic by 2030 (World Economic Forum, 2020), which indicates the importance of the transition towards more sustainable last-mile delivery.

## 2.3 Delivery Options

There are several different last-mile delivery options that customers can choose from. Figure 2.3 gives an overview of the most common delivery options, which are divided into three different areas: Home Delivery, Click & Collect, and Pick-up Point (Hübner, Kuhn & Wollenburg, 2016; Mangiaracina et al., 2015; Postnord, n.d.). The definition of the three delivery options (i.e., home delivery, click and collect, and pick-up point) will be discussed below.

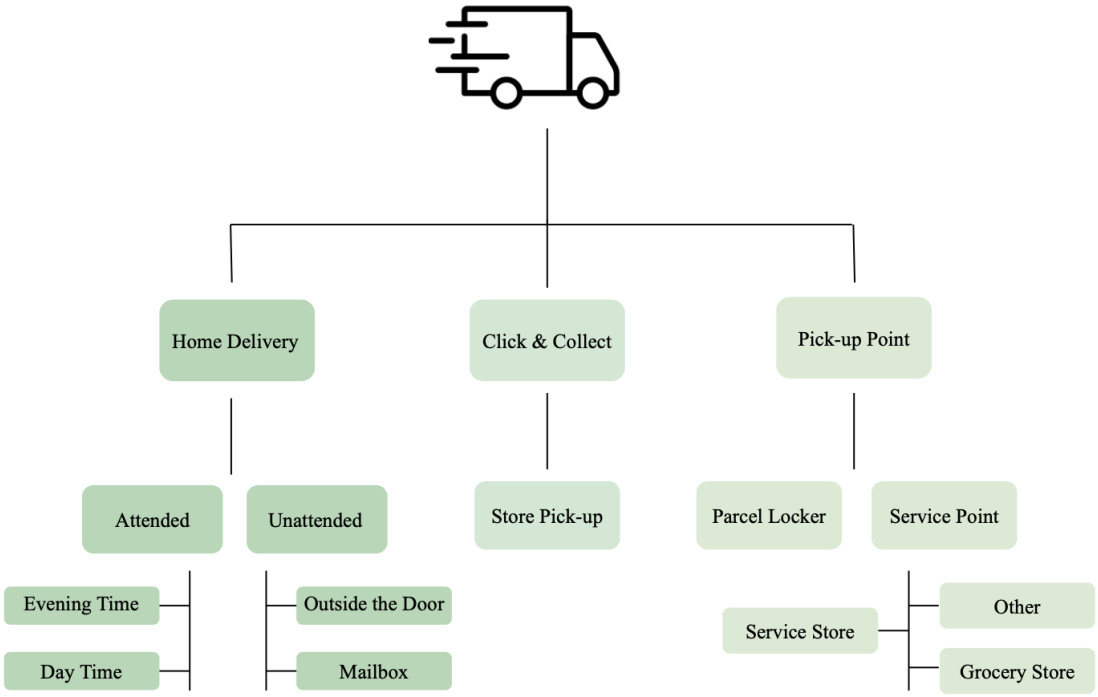


***Figure 2.3.*** *Summary of different last-mile delivery options.*

### 2.3.1 Home Delivery

Home delivery is defined as when packages are delivered directly to the customer's home. The delivery method began before the rise of e-commerce and the Internet, when customers had purchased substantial electronic goods for house fitting (Visser et al., 2014). The increase in purchased goods in the e-commerce sector contributes to a boost in in-home delivery services (Iwan et al., 2016) and is thus, the most common and desired method of last-mile deliveries

(Velazquez & Chankov, 2019). However, in many ways, home deliveries increase the number of unsuccessful deliveries when the customer is to be attended to (Kedia et al., 2017). An unsuccessful home delivery contributes to issues both for the customer and for the logistics service provider (LSP), as it increases the total shipping cost for the company when the parcel is to be delivered again. Furthermore, it would add to the overall traffic congestion and fuel emissions (Lachapelle et al., 2018). To address these issues, e-retailers have started focusing on other delivery options, such as click and collect and pick-up points (Velazquez & Chankov, 2019).

### 2.3.2 Click & Collect

The delivery method of click & collect is based on the concept of customer-ready parcels that are shipped from the central warehouses or distribution centers to the physical stores, where they are picked up by the customer (Melkonyan et al., 2020). Hence, it is only relevant for e-retailers that also have physical stores. The last part of the supply chain can be considered similar to the supply chain of a traditional retail store, as the store is the point where the product is transferred from the retail company to the customer. What differs from a traditional retail supply chain is that there have to be packaging activities for individual orders at the central warehouse or distribution center. The transportation from the store to the customer's home or end destination is carried out by the customer. Consequently, with click & collect, there is no need for an LSP, as the parcels can be transported from the central warehouse or distribution center to the store with the rest of the goods (Marchet et al., 2018). Another advantage of the e-retailer is that it brings customers to the store, which can result in additional purchases (Allen et al., 2018). From an environmental perspective, it could mean a reduction in emissions as there is no vehicle potentially running on fossil fuels delivering the parcels to individual customers' chosen destinations. What determines the resulting environmental impact is the mode of transport the customers use to reach the store (Jaller & Pahwa, 2020). Meaning that the lower operational cost for the e-retailer can result in a higher total emission cost.

### 2.3.3 Pick-up Point

A pick-up point is described as a predefined destination point where customers can collect their goods. There are generally two common pick-up points: parcel lockers and service points. The customer generally chooses a pick-up point for the delivery of goods due to convenience, but also because a pick-up point is a well-established delivery system that is, in general, a more inexpensive option for the customer and the company (Milioti, Pramatari & Kelepouri, 2020). The company can reduce its transportation costs and decrease unsuccessful deliveries by consolidating items at a joint destination point. This promotes sustainable freight transport as it eliminates the total number of journeys and reduces travel distance. Resulting in the elimination of fuel emissions and traffic congestion (Allen et al., 2018). However, customers may use motorized vehicles to collect the goods from the pick-up points, which can result in the same fuel emissions and traffic congestion as home delivery. For the delivery system to be sustainable and efficient, pick-up points need to be accessible through various pick-up point locations (De Oliviera et al., 2019).

### 2.3.4 Summary of the Delivery Options

A summary of the definitions used in this thesis for the three delivery options can be found below in Table 2.3.

***Table 2.3:*** *Summary of the different delivery options and the definition used in this thesis.*

| Delivery Option | Definition used in this thesis |
|---|---|
| Home Delivery | Packages are delivered directly to the customer's home (Visser et al., 2014). |
| Click & Collect | Parcels are shipped from the central warehouses or distribution centers to the physical stores, where they are picked up by the customer (Melkonyan et al., 2020). |
| Pick-up Point | A predefined destination point where customers can collect their goods (Milioti, Pramatari & Kelepouri, 2020). |

The three last-mile delivery options mean a difference in who is responsible for the transport of the different parts of the total last-mile delivery route, which is illustrated in Figure 2.4. For home delivery, the e-retailer's contracted LSP is responsible for the entire route from the central warehouse or distribution center to the customer's chosen destination. Whereas with the pick-up point and click and collect options, the customer handles the last part of the transport themselves (Hübner, Kuhn & Wollenburg, 2016).

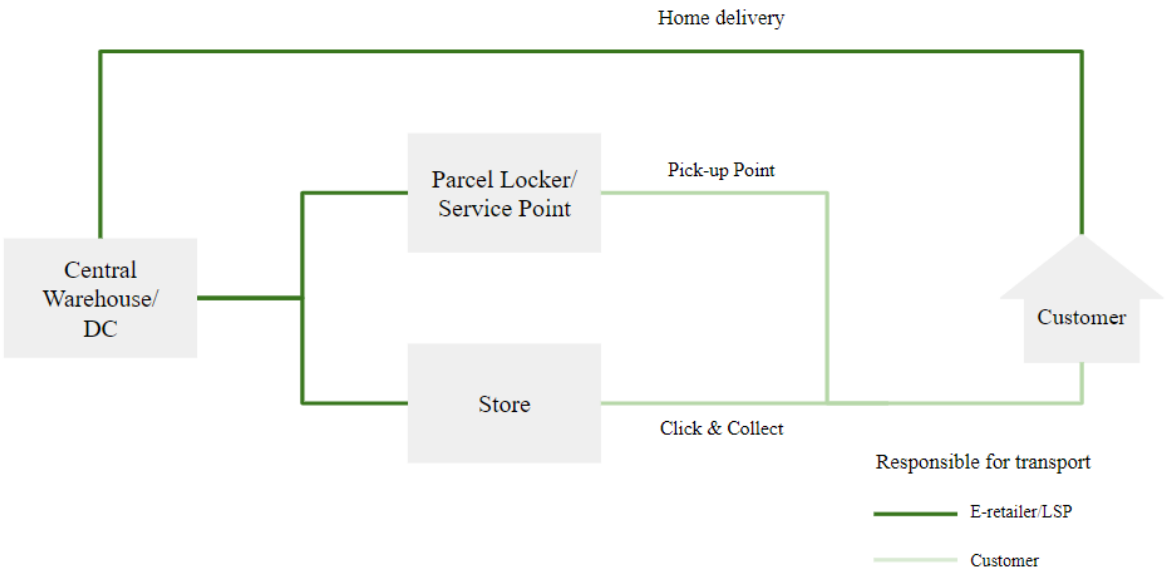


***Figure 2.4:*** *Responsible actors for different parts of the transport for the three delivery options.*

## 2.4 The Environmental Impact of Last-Mile Delivery

The field of last-mile delivery undergoes constant change, and sustainable delivery options in e-commerce are becoming an increasingly important challenge for society to deal with. To further discuss the importance of a transition towards sustainable last-mile deliveries in the future, it is important to understand the environmental impact road transport has today. Therefore, the environmental impact that road transport has will be explored first. After that, different factors affecting the environmental impact of last-mile deliveries will be discussed, and lastly, some of the biggest challenges for LSPs today will be outlined.

There are two main types of vehicles involved in last-mile delivery operations: light-duty vehicles (LDV) and heavy-duty vehicles (HDV), see Figure 2.5 (Allen et al., 2018). LDVs, also often referred to as vans, can carry up to 3500 kg in gross weight and are commonly used for routes in urban areas. HDVs, commonly called trucks, carry more than 3500 kg in gross weight and are used for more long-distance transports, but can be used in last-mile delivery transports as well (Allen et al., 2018). With the growth of e-commerce, the number of LDVs in cities has increased, and they are the most common type of vehicle in last-mile deliveries (Allen et al., 2018). Road transport represented more than two-thirds (71.1%) of total greenhouse gas (GHG) emissions from transport within the EU in 2019 (European Environment Agency, 2022). Of these emissions, 38.1% originated from goods transport, 11% from LDVs, and 27.1% from HDVs. It should be noted that these numbers include all transport with light- and heavy-duty vehicles, not just last-mile operations.


***Figure 2.5:*** *LDV and HDV from Postnord (Mercedes-Benz, 2022; Ehandel.se, 2018).*

The GHG emissions emitted consist of almost 99% carbon dioxide (i.e., $CO_2$), the rest being nitrous oxide ( $NO_2$) and methane ( $CH_4$). Emissions measurements are often converted into carbon dioxide equivalents. Hence, the amount of emitted GHG is also commonly referred to as emitted $CO_2$. Measuring emissions from road transport can be done in different ways, as illustrated in Figure 2.6. The first one is well-to-tank, which includes upstream emissions, which are emissions generated in the production, transport, and distribution of fuels and electricity. The second is tank-to-wheel, which includes the emissions generated from the fuel combustion in the engine while it is operating, and lastly, well-to-wheel, which is both of these scopes combined. Additionally, there are emissions generated from indirect land use changes when crops are cultivated to produce biofuels instead of food or feed. An example of this is when land areas that were previously uncultivated and held forests or other types of high-

carbon stock are transformed into agricultural land to produce biofuels such as biodiesel (HVO). The advantages of using biofuels are not always unambiguous, as emissions from indirect land use change may, in some cases, exceed the number of emissions that were saved by not using fossil fuels. The change in land use may also harm the ecosystems and biodiversity of these areas (European Environment Agency, 2022).

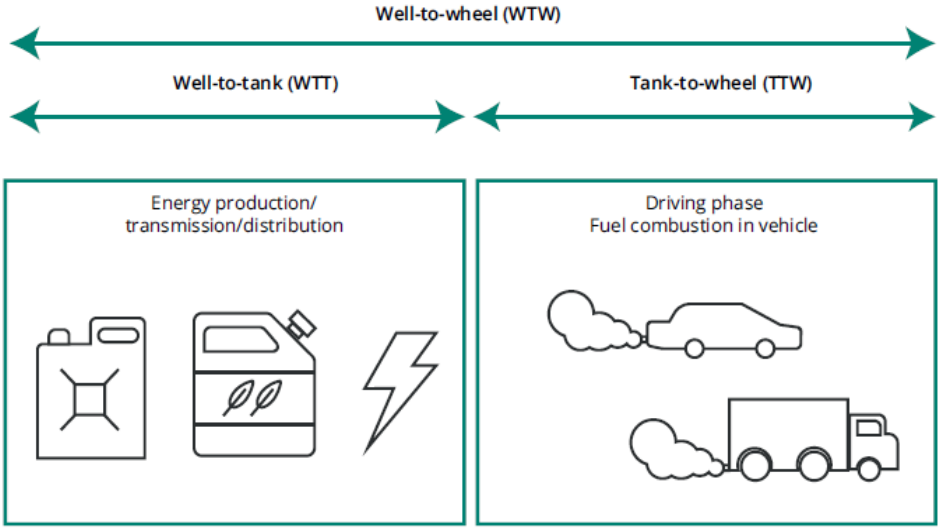


***Figure 2.6:*** *The different scopes of measuring emissions from road transport (European Environment Agency, 2022).*

While GHG emissions are an important metric, they are not the only way road transport has an environmental impact. It affects the environment in several aspects: exhaust emissions, non-exhaust air pollutants, noise, congestion, biodiversity loss, and resource use. For the transportation of one parcel a certain distance, the resulting environmental impact in terms of emissions may vary depending on the type of vehicle and fuel, while impacts in terms of, e.g., non-exhaust air pollution could be the same. In other words, a shift from vehicles run on fossil fuels to electric vehicles will reduce emissions, but other types of environmental impact will remain (European Environment Agency, 2022).

Last-mile delivery is the final connector between the e-retailer and the customer. As customers put increasingly higher demands on speed and flexibility, as well as convenience and free deliveries, many companies try to cut prices and lead times to stand out from competitors. Resulting in difficulty reaching profitability, but this also contributes to an increase in transport vehicles that in turn increase the climate impact of GHG. This makes last-mile deliveries the least efficient and most complex process within last-mile logistics (Kjellsdotter ivert et al., 2020; Brown & Guiffrida, 2014; Oláh et al., 2018; Gruchmann, Melkonyan & Krumme, 2018; Buldeo Rai, Verlinde & Macharis (1), 2018). Hence, the total environmental impact of last-mile deliveries depends on multiple factors, which will be explored further below.

### 2.4.1 Type of Vehicle

The transportation of goods is the most central part of the operations, and the type of transport used in the last-mile delivery has the largest influence on the environmental impact (Velazquez & Charkov, 2019). For example, LDVs consume more fuel than HDVs per transported metric ton. In terms of reducing emissions, the most effective way is to change the van fleet from vehicles driven by fossil fuels to other types of vehicles, such as battery-electric bikes or other smart vehicles (Nogueira et al., 2022). Further, Perboli et al. (2019) investigated freight transport and showed that if environmentally friendly vehicles are adopted, they can save GHG emissions, reduce time-sensitive deliveries, and affect all three dimensions of sustainability (i.e., social, economic, and environmental). However, studies generally indicate that a narrower time window for deliveries will generate more environmental damage (Gevaers, Van de Voorde & Vanelslander, 2009). Sustainability and delivery time for last-mile delivery are interrelated. Hence, to have more efficient delivery and to become more carbon-efficient, the LSP needs to operate with longer delivery times (Gevaers, Van de Voorde & Vanelslander, 2014; Bates, O.(1) et al., 2018).

### 2.4.2 Covered Kilometers

One method of measuring the average number of environmental impacts of last-mile deliveries is the average number of driven kilometers, or amount of emissions, per parcel. Inefficiencies, such as returns or failed deliveries, will cause an increase in emissions per parcel and thereby a negative environmental impact (Velazquez & Charkov, 2019). Since there are several competing last-mile delivery companies operating in the same area, routes are often duplicated, which results in more kilometers being driven than necessary. Through transport planning and management, it is possible to control the environmental impact of a delivery process (Mangiaracina et al., 2015; Velazquez & Chankov, 2019). They argued that it is the lack of transport management that causes these inefficiencies in the delivery process and thereby increases the negative environmental impact. Additionally, Van Loon et al. (2015) showed that the number of items to be delivered with the van had a direct correlation with the environmental footprint of each item. The more items, the lower the environmental footprint per item. This applies to all delivery methods. They also found that van deliveries with 2-22 items had the lowest amount of GHG emissions, explained by factors such as consolidation time, delivery distance, and the number of journeys needed for delivery.

Another part of the last-mile delivery process' potential to become more environmentally sustainable through fewer covered kilometers is to reduce the number of unnecessary shopping trips for customers (Jaller & Pahwa, 2020). A study by Cairns (2005) showed that if the customer's traditional shopping trip is completely replaced by van home delivery, there can be up to a 70% reduction in vehicle kilometers (van Loon, 2015). However, van Loon (2015) further argued that complete substitution is unlikely. With pick-up points, the shopping trips for the customer can be consolidated into one location, where the ordered goods can be collected at a parcel locker or service point. All the individual parcels still have to be delivered to this pick-up point, and as discussed above, the resulting environmental impact is highly

dependent on the type of vehicle and fuel the parcels are transported with, both by the courier and the customer.

### 2.4.3 Customers' Impact

In more recent studies, the customer perspective of logistics in e-commerce has gained more attention (Moroz & Polkowski, 2016; Nogueira, de Assis Rangel & Shimoda, 2021). Customers have limited options to influence companies' green delivery methods. They depend on e-retailers' shipping options as well as the sustainability of the deliveries that the LSPs supply to the customers but suffer from limited communication related to sustainability (Sallnäs & Björklund, 2020). However, customers' acceptance to pick up their orders at pick-up points or in e-retailers' stores offers the potential for companies to organize the delivery of goods in a more sustainable way (Visser, Nemoto & Browne, 2014). Altering customers' preferences for last-mile delivery and basing them on the sustainability of the delivery method instead of only justifying customers' demand can result in greater environmental sustainability (Ignat & Chankov, 2020).

Relevant knowledge about the sustainability of the different delivery methods is required to leverage the potential that both customers and companies can contribute regarding improving the sustainability of last-mile deliveries. Home deliveries are considered to be the worst delivery method when sustainability is considered, whereas collection of goods at e-retailers' stores or pick-up points has less impact on the environment (Visser, Nemoto & Browne, 2014). The retries of delivering the goods for home delivery can cause a high number of unnecessary kilometers in the last-mile delivery process (Buldeo Rai, Verlinde & Macharis (1), 2018; Yuen et al., 2018; Bosona, 2020). However, there are several factors to consider regarding how much the environment is impacted when different delivery methods are chosen. Examples of factors are geographical aspects (e.g., rural or urban areas), distance, type of vehicle being used, and product category (Song et al., 2009).

To emphasize, customers who make single trips to e-retailers' stores or pick-up points will increase the emitted GHGs more than if a courier that has route optimization made the delivery. It is estimated that single trips can emit over 20 times more GHGs than successful home deliveries (Edwards, McKinnon, & Cullinane, 2010). However, it is still argued by several authors that the consolidation of pick-up points reduces the need to perform several deliveries to various final destinations. Resulting in a reduction in both total travel distance and GHG emissions (Buldeo Rai, Verlinde & Macharis (1), 2018; Yuen et al., 2018; Bosona, 2020). In total, the emitted $CO_2$ could be reduced by 60% if home deliveries were to be replaced by pick-up points (van Loon et al., 2014).

### 2.4.4 Challenges in Last-Mile Delivery Today

As e-retailers' last-mile deliveries are inefficient, they become the costliest part of the supply chain. Last-mile delivery accounts for 41% of the total supply chain costs and 53% of the total shipping costs (World Economic Forum, 2020). This indicates that delivery efficiency is the

biggest challenge for LSPs today. Figure 2.7 provides an overview of the most significant challenges for LSPs in the last-mile delivery sector.

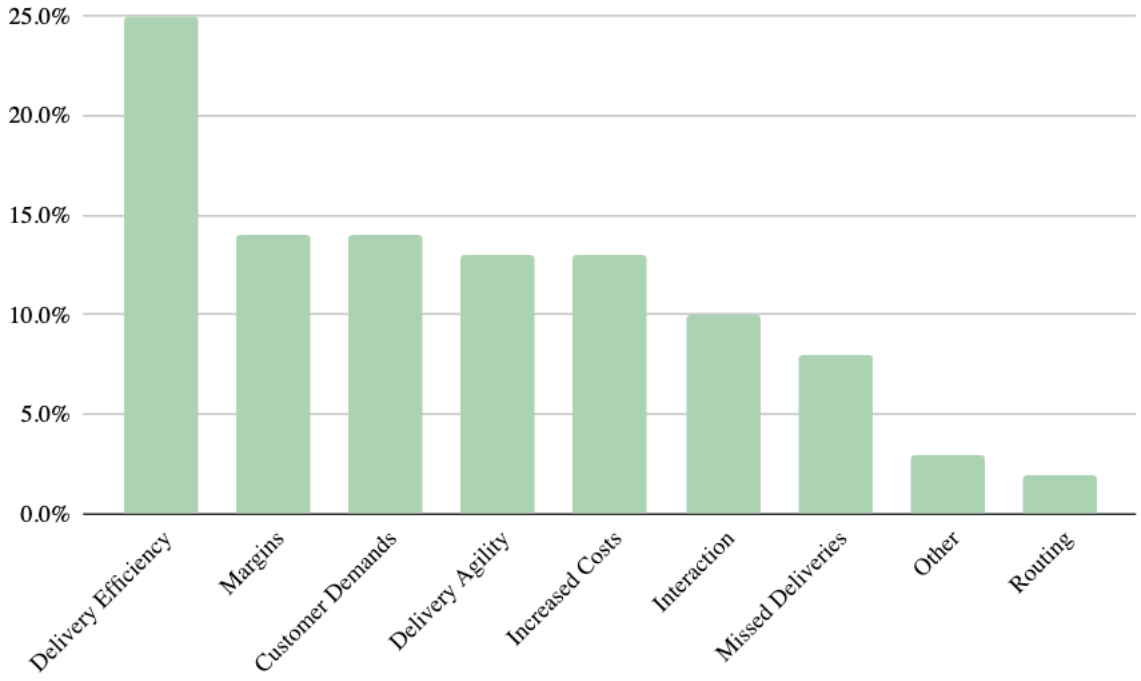


***Figure 2.7:*** *The biggest challenges with last-mile deliveries (Eft, 2018).*

The reason for the delivery inefficiency is mainly due to the competition in the sector and the low margins the LSPs work with. It is not uncommon for LSPs to subsidize deliveries and waive the minimum order size to compete. Therefore, organizations take a cut in the overall margin. Consequently, the delivery operations are subsidized to gain market share. The subsidized delivery operations cause inefficient use of resources and thus, an increase in carbon emissions and traffic jams (Luigi Ranieri et al., 2018; Iwan, Kijewska & Lemke, 2016). This creates challenges with the complexity of the delivery process, such as the offered delivery time frame, location of logistics centers, returns, seasonal rushes, end-customer expectations, and interactions, as well as the problem of delivery agility and missed deliveries (Allen et al., 2018; Eft, 2018; Jacobs et al., 2019).

Zero-carbon emission delivery alternatives, for example, cargo bikes and/or electric vehicles, can be a solution to decrease GHG and make last-mile delivery a less costly process (Luigi Ranieri et al., 2018; Buldeo Rai, Verlinde & Macharis (1), 2018). However, the conversion from fossil fuels to electric vehicles is a problem for many logistics companies since an increase in electrification puts a high demand on technical performance. Hence, consideration of range and charging stations must be considered when routes are to be planned. Many LSPs mention that there are longer delivery times on new transport vehicles, and due to the lack of components during the pandemic (Frieske & Stieler, 2022), the delivery time has further increased. In addition, the prices of fuel as well as electricity have significantly increased during the pandemic and the Russian invasion of Ukraine (Kuik et al., 2022). Resulting in a

risk of even further minimizing profitability for LSPs and instead increasing freight costs (Trafikanalys (2), 2022).

## 2.5 Communication of Sustainable Last-Mile Delivery

With an understanding of the environmental impact of last-mile deliveries, it is of interest to investigate if customers and companies know about sustainable last-mile deliveries. Firstly, sustainability branding will be discussed as to why it can be important for companies to give sufficient information to their customers. Secondly, customers' knowledge about sustainable deliveries will be studied, and lastly, some reasons why e-retailers fail to give out information about which LSPs are sustainable will be discussed.

### 2.5.1 The Importance of Sustainability Branding for Companies

The idea of branding appeared as a response to customers having difficulty differentiating products from the various brands that were on the market (Roper & Fill, 2012). According to Berens (2007), branding can be defined as an attempt to personalize the business to create value from the corporation's institutional activities, employees, portfolio of services and products, strategic position, and organization. This means that since customers' relationships are more tied to the business than the brand, companies must become the brand to create trust and longevity (Kapferer, 2012; Roper & Fill, 2012). Chandler and Werther (2020) mentioned that brands that drive different sustainability initiatives are presented as being more trusted and thus, performing better when adapting to the environment they are operating in.

Several authors point out the relationship between sustainability and branding (Flores-Hernández et al., 2020; Werther & Chandler, 2005; Grubor & Milovanov, 2017; Kumar & Christodoulopoulou, 2014; Vallaster, Lindgreen & Maon, 2012; Miller & Merrilees, 2013). This connection creates the opportunity to positively influence customers' attitudes toward companies' branding, which in turn creates competitive advantages (Kumar & Christodoulopoulou, 2014; Miller & Merrilees, 2013). A study made in Peru shows that a business that conducts sustainability initiatives can positively impact the brand, which can increase both word of mouth and customer satisfaction (Flores-Hernández et al., 2020).

Corporate brands that have sustainability as a value will give individual businesses competitive advantages as well as contribute to corporate sustainability. Sustainability branding can decrease the risk of misinformation or information failure between customers and firms. Information failure occurs when one party has more information than the other. In the context of companies' sustainability, their customers receive only limited and chosen information about it, which makes it difficult for the customer to identify which companies are sustainable (Erdem, Swait & Valenzuela, 2006). Incorporating sustainability into companies' branding and giving customers information about it can ease customers' decision-making and help them identify sustainable companies (Kumar & Christodoulopoulou, 2014; Miller & Merrilees, 2013).

### 2.5.2 Marketing Regulations

The Swedish Consumer Agency (2023) mentioned that the increasing number of terms for sustainability seems to cause more confusion than clarity among consumers. Companies are required by Swedish law to formulate all marketing claims in such a way that customers are not misled (SFS 2008:486, §9) and those claims must be verified (Konsumentverket, 2023). The fact that the claims need to be verified means the company has to prove the claim is true, and this can be done by, for example, having a document or certificate of what is promised to the customers (Konsumentverket, 2005). The customer, who may not be well-informed in the area, should not be misled by the information provided. Therefore, general environmental claims, such as *"Environmentally friendly"*, are considered imprecise and unclear for the common customer and thus, should only be used if a thorough investigation of the claim has been carried out. Additionally, it is not allowed to market something as having greater environmental benefits than it does. Descriptions of sustainability should be unambiguous; if they are not, there should be a description available in direct proximity to the claim. The requirements of proof are especially strict on environmental claims (Konsumentverket, 2023). In the context of last-mile delivery, according to §10 in The Marketing Act (SFS 2008:486), e-retailers who use one of the common terms for sustainable delivery have to be clear and precise about what the term means, and they also need to verify that the LSP is, for instance, "*100% Fossil-free"*.

In 2022, an industry agreement was introduced regarding fossil-free delivery. The agreement aimed to create rigor in e-retailers' check-outs. The idea was to make it easier for customers to know what the term means when they decide on their preferred sustainable delivery method. However, e-retailers still need to continuously validate that the LSP meets the requirements for fossil-free last-mile delivery (Aster (1), 2022), and if a fossil-free last-mile delivery option is offered in the check-out, then the following information should be available in the connection of the used term:

"*Delivery of your order takes place with fossil-free fuel consisting of electricity, muscle power or biofuel from the e-retailer's warehouse to your chosen delivery location. Does not apply to returns. Read more here (link to extended information).*" (Aster (2), 2022)

### 2.5.3 Customers' Knowledge of Sustainable Last-Mile Deliveries

When customers place orders, they will get a chance to choose between the various last-mile delivery methods that are based on the delivery time frame and cost. Information about the environmental impact is rarely addressed by e-retailers, which can make it difficult for customers to identify sustainable last-mile options. Research shows that customers are more likely to consider sustainable deliveries if information about which LSPs offer sustainable last-mile deliveries is provided. In particular, it has been shown that customers are willing to pay more, choose a less convenient delivery location, or wait longer in exchange for an environmentally-beneficial last-mile delivery (Ignat & Chankov, 2020). This is also confirmed by Buldeo Rai et al. (2021), who state that providing the environmental footprint of the delivery options will act as an incentive for customers to choose a delivery option. However, if no or

limited information is provided, customers will ignore any dimensions of the environmental impact of the last-mile deliveries and will probably choose the most economical delivery (Ignat & Chankov, 2020).

Narula and Desore (2016) emphasize that customers who lack knowledge are more inclined to be confused. Information failure can make decision-making a complicated process for many customers since it may require looking for the missing information at external sources. This implies a greater effort for customers. Lack of information is a missing effort in sustainability branding for companies to promote correct information to their customers (Kumar & Christodoulopoulou, 2014; Miller & Merrilees, 2013; Erdem, Swait & Valenzuela, 2006; Narula & Desore, 2016).

A survey conducted by PFM Research on behalf of Airmee, a Swedish LSP, showed that customers are having difficulty knowing the difference between different fuels and their environmental impact. 62% of the respondents state they do not know the difference between fossil-free and emission-free (i.e., fossil-free stands for the origin of the fuel, whereas emission-free, refers to how much is emitted during combustion). The lack of knowledge about the environmental impact different fuel types have can make it harder for the transport industry to become more sustainable. In addition, the CEO and founder of Airmee, Julian Lee, states that it can also mean some companies can claim that the delivery is *"Environmentally friendly"* even if this is not the case (PFM Research, 2021).

### 2.5.4 Reasons for Lack of Information

As the environmental dimension of sustainability has gotten more attention over the years, mathematical formulations for routing optimization have been investigated (Lin et al., 2014), sustainable concepts have been introduced (Buldeo Rai, Verlinde & Macharis (2), 2018), and the environmental impact of last-mile deliveries has been thoroughly analyzed (Velazquez & Chankov, 2019). However, there are still companies that give no or limited information about the environmental impact of the various delivery methods (Ignat & Chankov, 2020), which makes it difficult for customers to identify sustainable delivery methods (Erdem, Swait & Valenzuela, 2006). Reasons for this can be that there is no comparable measurement of the amount of $CO_2$ per package in the industry, there is a lack of knowledge, companies have a fear of being accused of greenwashing, and lastly, it has a competitive aspect (Dubisz, Golinska-Dawson & Zawodny, 2022; Sallnäs et al., 2022; Trafikanalys (1), 2022).

The difficulty of setting a comparable measurement of the amount of $CO_2$ per package is due to both conditions, and the calculation methodology can differ between companies (Dubisz, Golinska-Dawson & Zawodny, 2022; Sallnäs et al., 2022). The approach of calculating $CO_2$ can be a work-intensive process that requires dedicated resources, and the calculations can be done by obtaining real-time measurements or estimations that are based on different models and emissions factors (Pandey, Agrawal & Pandey, 2011). For this reason, many companies use general databases to get a hold of specific emissions factors. Access to reliable and comprehensive data is a challenge for companies, and this is the result of different $CO_2$

footprint calculations (Dubisz, Golinska-Dawson & Zawodny, 2022). An example of this is when two LSPs' $CO_2$ emissions per package, which were transported approximately the same distance, are compared. One provider reported 35g $CO_2$ per package, whereas the other provider reported 137g $CO_2$ per package. Resulting in a difference in total $CO_2$emission of almost 400%, which shows the lack of standardized methods in the industry (Trafikanalys (1), 2022).

According to Sallnäs et al. (2022), e-retailers do not have enough knowledge to convey the environmental impact of the different last-mile delivery options they offer to their customers. Moreover, the different terms (e.g., *climate-smart, environmentally friendly, carbon offsetting*) the LSPs use not only make it difficult for customers but also e-retailers to understand. Hence, the lack of standardization of different sustainability terms in last-mile deliveries increases the risk of greenwashing (i.e., making claims to deceive customers into thinking that a company is sustainable) (Cambridge Dictionary (2), n.d.). It should be mentioned that a proposal to fix the mentioned problems through guidelines or regulations can have a negative impact, which is why e-retailers argue whether this is the right way to go or not (Sallnäs et al., 2022; Trafikanalys (1), 2022).

There is also a competitive aspect to take into consideration for e-retailers. According to Ingrid (2023), a software platform provider for e-commerce deliveries, 70% of customers choose the preselected delivery option. Research has also shown that delivery options at the top of the check-out will be chosen to a greater extent than other delivery alternatives. It should be noted that a top option does not necessarily have to be preselected, but a preselected option will always be the top option. When different LSPs are placed in a certain order, the likelihood of an LSP getting the greatest number of orders will increase if they are placed first. Depending on whether sustainability is important for e-retailers' management, LSPs can use environmental arguments and/or only cost arguments in the negotiation with e-retailers to be at the top of the check-out (Sallnäs et al., 2022).

## 2.6 Conceptual Framework

Following the theoretical framework on last-mile delivery, the delivery options, and the environmental impact of last-mile delivery, a conceptual framework has been developed, see Figure 2.8. Firstly, the framework consists of the definition of last-mile delivery, which has been defined as the last segment of B2C delivery that takes place from the last transit point to a final consignee's preferred collection point (Lim, Jin & Srai, 2018; Gevaers, Van de Voorde & Vanelslander, 2014; Harrington et al., 2016). The customer can choose the final consignee's destination point by selecting one of the three different delivery options: home delivery, click & collect, or pick-up point. These three last-mile delivery methods will all have an environmental impact depending on multiple factors, such as the type of vehicle, covered kilometers, and customers' impact. Therefore, it is important for the customer to know which last-mile delivery alternatives are sustainable or have the least impact on the environment before making a conscious decision. However, some e-retailers do not give out this information to their customers, and according to the literature study that has been done, this depends on the

following factors: terminology, lack of knowledge from both customers and companies, no comparable measurement for $CO_2$, fear of greenwashing, and competitive aspects. These factors will eventually determine and affect e-retailers' decisions to offer and communicate environmentally sustainable last-mile delivery options accurately.

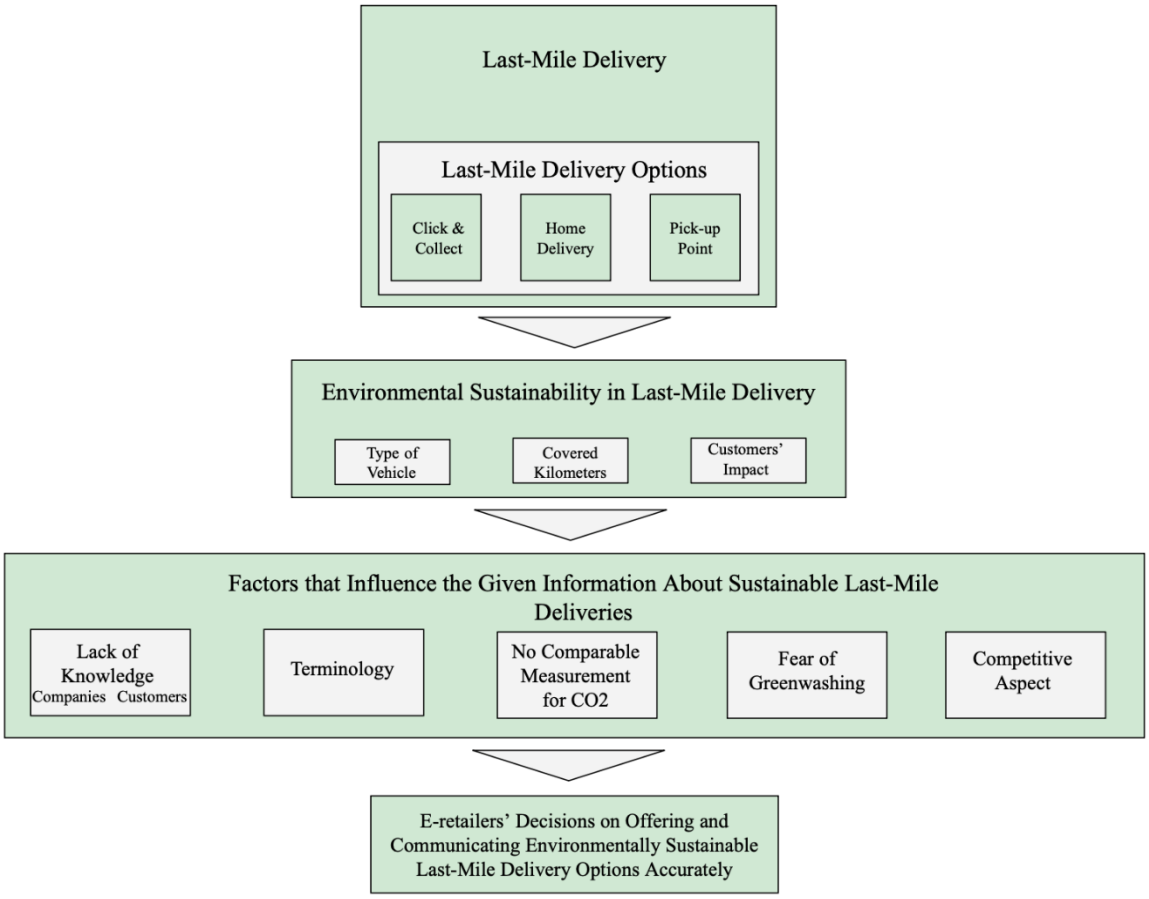


***Figure 2.8:*** *Conceptual framework derived from the literature review.*

# 3. Methodology

*This chapter will describe the research process and the method used to fulfill the objectives as well as the research questions. The research strategy will describe the chosen research method. The research design will be outlined in a figure to give the reader a holistic overview of the research approach and design. Furthermore, the literature review will cover how the literature and methodology can be used, which will form the basis for the research strategy. Finally, the ethics, credibility, and validity of how the data was collected will be discussed.*

## 3.1 Research Strategy

To get the desired result from the study, it is important to choose one or several relevant methods. There are two different research strategies to choose from: quantitative and qualitative. A quantitative approach provides a generalization of reality, which works well when the study needs to be based on large amounts of data that are then quantified. The qualitative strategy provides a more exploratory approach (Lekvall & Wahlbin, 2001; Bryman & Bell, 2017; Justesen & Mik-Meyer, 2011).

Several studies examine the impact of delivery options on the environment. The studies use different methods, with a quantitative approach being the most common (Edwards, McKinnon & Cullinane, 2010; van Loon et al., 2015; Brown & Guiffrida, 2014; Buldeo Rai, Verlinde & Macharis (1), 2018; Allen et al., 2018). However, there are also literature reviews (Bertram & Chi, 2018; Mangiaracina et al., 2015) and qualitative strategies (Edwards, McKinnon & Cullinane, 2010; Grunchmann, Melkonyan & Krumme, 2018). Although a quantitative approach is the most common in this field, a qualitative strategy with a business perspective was chosen as the main research strategy. This is because the strategy intends to contribute to an increased understanding of why and how e-retailers offer environmentally sustainable last-mile delivery options, and due to that, an explorative deep dive into the area is required. Therefore, this thesis' goal of using a qualitative strategy is to generate insights into the underlying reasonings and motives related to e-retailers' decisions on offering and communicating environmentally sustainable last-mile deliveries. It should be mentioned that a quantitative method, a mapping of Sweden's 100 largest e-retailers, was used to support the qualitative methods. Through this combination of qualitative and quantitative methods, it was ensured that the study fulfilled its purpose.

## 3.2 Research Approach

Given the gap in research in the field of sustainable last-mile deliveries from the perspective of the e-retailer, it is necessary to have an exploratory research approach. The exploratory research approach can help to investigate areas where the phenomenon is not fully understood (Voss, Tsikriktsis & Frohlich, 2002). Furthermore, Edmondson and McManus (2007), state that when there is a lack of research and theory, qualitative data should be collected through, for instance, interviews. Hence, methods, where statistical modeling and/or optimization are not suitable for this thesis due to the goal, are to verify the existing theory and not to test it (Voss, Tsikriktsis & Frohlich, 2022; Meredith, 1998).

Why and how e-retailers offer environmentally sustainable last-mile delivery options is the phenomenon that is being studied in this thesis, and the aim is to contribute to knowledge within the area. The thesis is a mapping of the current landscape of environmentally sustainable last-mile deliveries in Sweden and an interview study that is designed to emulate a case study methodology. Furthermore, to be able to answer the research questions, there is a need to compare similarities and differences between literature and empirics to identify unique patterns. Therefore, within-case and cross-case analyses will be used to analyze the data. It should be emphasized that this thesis is not a single-case study but uses case study methodology (i.e., cross-case analysis and within-case analysis) to answer the research questions.

### 3.2.1 Unit of Analysis

The unit of analysis will determine the research design and data collection strategy of the thesis (Yin, 2009). It must define and set the boundaries of the scope to ensure the research questions will be answered in the intended way. In this thesis, we will investigate what defines an environmentally sustainable last-mile delivery, which last-mile delivery options Swedish e-retailers offer, and why, as well as how e-retailers offer sustainable options. The unit of analysis in this thesis is therefore the decision and communication of last-mile delivery options in Swedish e-commerce.

### 3.2.2 Research Design

When the unit of analysis, research approach, and strategy are defined, the design of the research process is determined. The purpose of a defined research structure is to illustrate the connection between the research questions and conclusions with the empirical data and the logical plan from start to finish (Yin, 2009). An overview of how the research will be approached and how it is designed can be seen in Figure 3.1. Having an established design for how the research will be conducted is of great importance during the process of collecting and analyzing data.

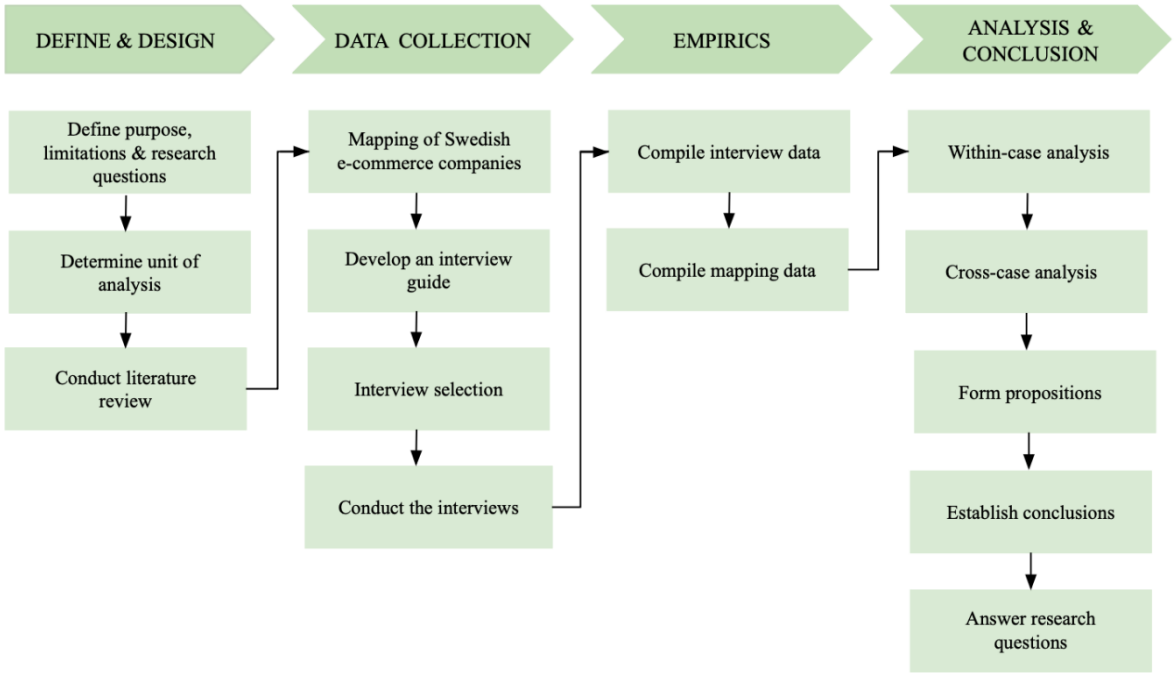


***Figure 3.1:*** *A visualization of the research design.*

### 3.2.3 Literature Review

To visualize the limited research within environmentally sustainable last-mile deliveries and how e-retailers work with it, a study of the number of results for various search terms and filters on LUBsearch was conducted, see Appendix A. The filters of 'academic journals' and 'peer-reviewed' were applied for the search to ensure the quality of the results. As can be seen in Figure 3.2, there is a significant difference in the number of articles concerning last-mile delivery and articles concerning last-mile deliveries combined with the terms *"sustainability"* or *"environmental"*. For example, the results with both search filters showed that the number of results for *"environmental last-mile delivery"* was 21% of the number of results for *"last-mile delivery"*. This implies a gap in knowledge and interest in the field of environmentally sustainable last-mile deliveries.

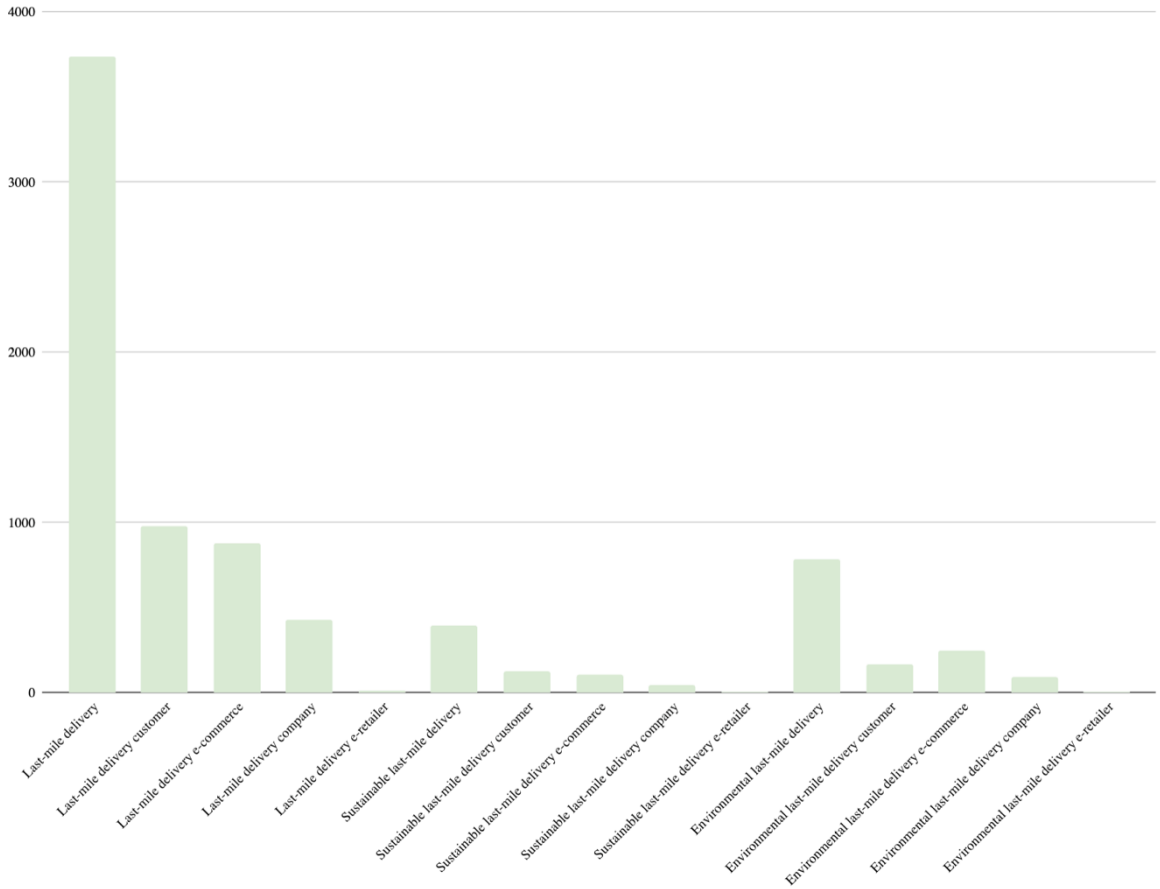


***Figure 3.2.*** *Number of results for different search combinations with 'academic journals' and 'peer-reviewed' as filters in LUBsearch.*

A literature review is essential for all research projects, as it gives an overview of a certain issue and may, for many research questions, is the best method to find answers (Snyder, 2019). Snyder describes it as a method for gathering and using previous research as a foundation to then be able to further develop theories and knowledge in the research area. The purpose of this literature review was to answer the first research question, provide a theoretical foundation for research questions two and three, and then be able to formulate the conceptual framework and interview guide. Throughout the thesis, statements have been supported by mutliple references to ensure credibility. The literature review was divided into four parts: what a last-mile delivery is, which options of last-mile delivery there are, what an environmentally sustainable last-mile delivery is, and the communication of this.

To find relevant literature for the first part, search words such as *"last-mile delivery", "last-mile delivery e-commerce",* and *"last-mile delivery customer"* were used on LUBsearch. This resulted in several definitions of last-mile delivery by different authors.

- Olsson, J., Hellström, D. & Pålsson, H. (2019) 'Framework of Last Mile Logistics Research: A Systematic Review of the Literature', Sustainability, 11(24). doi:10.3390/su11247131

- Lim, S.F.W.T., Jin, X. & Srai, J.S. (2018) ‘Consumer-driven e-commerce’, International Journal of Physical Distribution & Logistics Management, 48(3), pp. 308–332. doi:10.1108/IJPDLM-02-2017-0081
- Gevaers, R., Van de Voorde, E. & Vanelslander, T. (2014) ‘Cost Modelling and Simulation of Last-mile Characteristics in an Innovative B2C Supply Chain Environment with Implications on Urban Areas and Cities’, Procedia - Social and Behavioral Sciences, 125, pp. 398–411. doi:10.1016/j.sbspro.2014.01.1483
- Harrington, T.S. et al. (2016) ‘Identifying design criteria for urban system “last-mile” solutions – a multi-stakeholder perspective’, Production Planning & Control, 27(6), pp. 456–476. doi:10.1080/09537287.2016.1147099

The second part of the literature review focused on the different types of last-mile deliveries that are the most common. After the delivery options were identified, they were researched individually. Some of the key references for this were:

- Hübner, A., Kuhn, H. & Wollenburg, J. (2016) ‘Last mile fulfilment and distribution in omni-channel grocery retailing : A strategic planning framework’, International Journal of Retail & Distribution Management, 44(3), pp. 228–247. doi:10.1108/IJRDM-11-2014-0154
- Mangiaracina, R. et al. (2015) ‘A review of the environmental implications of B2C e-commerce: a logistics perspective’, International Journal of Physical Distribution and Logistics Management, 45(6), pp. 565-591–591. doi:10.1108/IJPDLM-06-2014-0133

The third part was focused on the environmental sustainability of last-mile delivery. This was further divided into defining environmental sustainability in general, defining terminology used in the field, the environmental impact of road transport, and the environmental impact of last-mile deliveries. Keywords like *“sustainable last-mile deliveries”, “last-mile delivery environmental impact”,* and *“road transport environmental impact”* were used to find relevant references. The following references provided the main foundation for the sustainability part of the literature review:

- Velazquez, R. & Chankov, S. M. (2019) ‘Environmental Impact of Last Mile Deliveries and Returns in Fashion E-Commerce: A Cross-Case Analysis of Six Retailers’ 2019 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), doi: 10.1109/IEEM44572.2019.8978705
- Allen, J. et al. (2018) ‘Understanding the impact of e-commerce on last-mile light goods vehicle activity in urban areas: The case of London’, Transportation Research Part D, 61(Part B), pp. 325–338. doi:10.1016/j.trd.2017.07.020
- Nogueira, G. P. M. et al. (2022) ‘The environmental impact of fast delivery B2C e-commerce in outbound logistics operations: A simulation approach’, Cleaner Logistics and Supply Chain, 5, doi:10.1016/j.clscn.2022.100070
- European Environment Agency (2022) ‘Transport and environment report 2021: Decarbonising road transport - the role of vehicles, fuels and transport demand’. doi:10.2800/68902

The fourth part of the literature review was focused on the communication of environmentally sustainable last-mile deliveries and the challenges and opportunities that occur for e-retailers. The goal was to find the main factors that affect the e-retailers' decisions on which last-mile options they offer. To find literature on this, keywords such *as "sustainability branding", "last-mile deliveries marketing regulations", "last-mile deliveries challenges",* and *"sustainability customer knowledge"* were used. This resulted in the following key references:

- Miller, D. & Merrilees, B. (2013) 'Linking retailer corporate brand and environmental sustainability practices', *Journal of Product and Brand Management*, 22(7), pp. 437-443–443. doi:10.1108/JPBM-10-2013-0417.
- 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*, 31(3), pp. 521–548. doi:10.1108/IJLM-11-2019-0305.
- Konsumentverket (2023). 'Miljöpåståenden i reklam'. Available at: https://www.konsumentverket.se/for-foretag/marknadsforing/miljopastaenden-i-reklam/.
- Sallnäs, U., Eng-Larsson, F., Björklund, M., Huge-Brodin, M., Haag, L., Blumenthal, L. & Johansson, D. (2022) 'Klimatsmart e-handelsdistribution- Hur svårt kan det vara?' *Supply Chain Effect,* (4), ss. 13-18. Available at: https://sceffect.se/wp-content/uploads/2022/09/SCE-No4-2022-webb.pdf.

From the data collected in the literature review, a deeper and more thorough understanding of the subject was achieved, and from this, we could start to formulate the conceptual framework and which questions should be included in the interview guide. Two main themes were identified that constituted the foundation for the interview questions for the company representatives. The two themes were *"Sustainability*" and *"Decisions regarding environmentally sustainable deliveries"*. The interview guide is presented in Appendix C.

## 3.3 Data Collection

Two different data collection methods have been used to fulfill the purpose of this thesis and answer the research questions. One method was used to collect primary data and another to collect secondary data. According to Lekvall and Wahlbin (2001), primary data is information that the researchers collect themselves, and secondary data is information that has already been collected by other researchers. The collection of primary data was made using semi-structured interviews as well as mapping of which delivery options the 100 biggest e-retailers in Sweden have, and the method for the collection of secondary data was a theoretical review. By using different data collection methods, an attempt to further and better triangulate the final result could be made.

### 3.3.1 Mapping

The purpose of the mapping was to provide an understanding of which e-retailers offer environmentally sustainable last-mile delivery options and how they communicate this. Through the mapping, the information could be organized, which gave a clear overview and compilation of the data. This was then used for the semi-structured company interviews, where the mapping showed which key players exist and which delivery options they offer. The

mapping also gave a holistic overview of the current situation of environmentally sustainable last-mile delivery options offered by e-retailers in Sweden.

The selection for the mapping was made based on the 100 largest e-retailers in Sweden in 2021 (Gunnilstam, 2021) that have material package deliveries, do not have omni-channels, and where purchases can be made as a private person and not only as a company. Access to the e-retailers' delivery options was made by starting a purchase on each website for around 400 SEK, and the package was set to be delivered to Lund. When delivery options became available, this was written down in an Excel spreadsheet, and a compilation of the data was made. Identification of companies that offered sustainable delivery options was done by distinguishing companies that used keywords such as *"Fossil-free", "Climate-smart", "Carbon offsetting"*, and *"Environmentally friendly"*.

It should be noted that LSPs such as Budbee and Instabox deliver goods with renewable fossil-free diesel (HVO) and are thereby a sustainable delivery option (Budbee, n.d.; Eriksson, 2021). However, if the customer is not aware of this and the e-retailer does not explicitly write out that the delivery is *"Fossil-free", "Climate-smart", "Carbon offsetting"* and/or *"Environmentally friendly",* then the customer does not know that it is a sustainable delivery option. One example of this can be seen in Appendix B, where one e-retailer has both Budbee and Instabox as LSP options but does not emphasize that they are sustainable delivery options. In contrast, the other e-retailer in Appendix B has explicitly written *"Fossil-free"* on the different delivery options. If the e-retailer does not use any of the keywords mentioned above or write out that the delivery option is sustainable, then it is assumed that the e-retailer does not offer any sustainable delivery options to the customer, even if the e-retailer has, for instance, Budbee and/or Instabox as an LSP option.

The Excel spreadsheet was divided into several sheets and coded according to the different industries in which the e-retailer operated. Themes were then created for each sheet, where information on shipping cost, shipping company, industry, time window, delivery options, and potential sustainable delivery options was noted. The companies that offered one or several sustainable delivery options were compiled in one sheet and those that did not offer sustainable delivery options in another sheet, which led to an easier comparison of the companies. The analysis was the basis for the selection of company interviews for the qualitative approach.

### 3.3.2 Semi-structured Company Interviews

The mapping identified which e-retailers do and do not offer sustainable last-mile deliveries, and this provided the basis for which companies were contacted. The purpose of the semi-structured company interviews was to find out why some companies offer and some do not offer sustainable delivery options, and what affects this decision. This was then analyzed to see if it has an impact on whether the e-retailer follows up on the LSPs' environmental claims with, for example, $CO_2$ emissions.

Environmental claims are mainly used for products or services that are harmful to the environment, and thus, these claims are widely used in connection with last-mile delivery. Since the increased use of transport vehicles contributes to a negative environmental impact through increased emissions of GHGs, the last-mile delivery is considered to be the least sustainable part of the distribution chain (Brown & Guiffrida, 2014; Kjellsdotter Ivert et al., 2020; Oláh et al., 2018; Gruchmann, Melkonyan & Krumme, 2018). Therefore, an interview with Gunilla Welander, a lawyer at the Swedish Advertising Ombudsman, was conducted to clarify the jurisdiction of the environmental claims and what liability e-retailers have when those claims are used.

The mapping of the 100 largest e-retailers resulted in 72 companies after excluding e-retailers that have omni-channels, do not have material package deliveries, and where only purchasing as a company is possible. Of the 72 companies, 25 e-retailers offered sustainable last-mile delivery. To be able to get a better holistic overview of, for example, how the ranking of different LSPs in the check-out was made, why some last-mile delivery options are sustainable, and which delivery option is the most popular option for the customers, e-retailers that solely offered one delivery option were excluded. This narrowed the selection down to 55 of the largest e-retailers in Sweden. All 55 e-retailers were contacted for participation in an interview, but only six e-retailers wanted to participate. It should be noted that these 55 companies were filtered for the interview selection, but all 72 e-retailers were included in the mapping. A summary of the respondents who participated in the semi-structured company interviews can be seen in Table 3.1. The table shows that all respondents met the criteria that were set and what the study was asking for.

***Table 3.1:*** *A compilation of which informants participate in the semi-structured company interviews.*

| Company | Position | Industry | Place | Length (minutes) | Date |
|---|---|---|---|---|---|
| Alpha | Brands and Sustainability Manager | Fashion | Teams | 40 | 22-02-2023 |
| Beta | Head of Freights and Business Developer | Pharmaceutical | Teams | 40 | 28-02-2023 |
| Gamma | External Logistics Lead | Beauty | Teams | 45 | 23-02-2023 |
| Delta | Director of Logistics | Beauty | Teams | 55 | 07-03-2023 |
| Epsilon | Director of Logistics | Fashion | Teams | 45 | 24-02-2023 |
| Zeta | Head of Delivery | Books | Teams | 45 | 27-02-2023 |

Barely 11 % of the contacted companies agreed to do an interview. The rest of the companies either claimed they did not have time, that their information was confidential, or did not reply at all. This might suggest on a broader scale that there is a low interest in both contributing to sustainable development in the last-mile delivery field as well as general sustainability issues among e-retailers. It could also be due to the size of the company being too large and the fact that the information about the study never reached the right person. However, we did reach out to customer service and sent messages to CEOs, COOs, and the Head of Logistics for each company that did not respond to us, and we were still left with no reply. We can only assume that the reasons for this may be that the e-retailers have too much to do that is of higher importance, sustainability within the last-mile is not a priority, the person does not know how to answer the questions, and/or the person does not want to be in the study. However, for the people who expressed an interest in participating in the interviews, an invitation was sent out with the date, time, and interview guide.

### 3.3.3 Data Analysis

All respondents were contacted in good time before their interview was scheduled to take place. Each interview was introduced with an introduction about what the goal of the interview was. The introduction also covered short explanations of each theme, and ethics were explained to the respondent. This meant they were allowed to anonymize their name and company name in the study if they wished. All company interviews were adjusted to approximately 45 minutes, where it was estimated that the main questions would take 30 minutes and the remaining 15

minutes would provide the opportunity to open up for discussion. All the interviews were conducted digitally since it generated greater flexibility and allowed a wider target group to be reached. This meant that the geographical factor was removed and more company interviews could be conducted. All interviews were documented by audio recording, and this was communicated in advance to each respondent who approved it. By recording all company interviews, the risk that essential information would be overlooked was minimized.

The data collection process is considered challenging due to the large volume of data that is generated (Voss, Tsikriktsis & Frohlich, 2002). To be able to explain the phenomenon that is being studied, the researchers have to go through various steps to summarize and analyze the data. These steps can, according to Miles and Huberman (1994), be summed up as follows:

1. Summarize and pack the data: Reconstruct the interviews as written notes and code the data to find the different categories.
2. Repack and aggregate the data: Search for similarities and differences to identify the themes.
3. Develop and test propositions to construct a framework: Cross-check the findings and integrate the data.

To follow these steps, two key activities were identified to analyze the data: within-case analysis and cross-case analysis. The aim of using within-case analysis was to develop a preliminary theory that would later serve as the basis for comparing similarities and differences in the cross-case analysis (Eisenhardt, 1989). As has been mentioned before, this thesis is not a single-case study but uses case study methodology to answer the research questions and explain the phenomenon.

***Within-case analysis***

The first phase of the analysis is the within-case analysis, which is done by summarizing and packing the data from the interviews. The written notes and the transcription should be coded to identify the various categories as well as the linkages to find a set that fits (Miles and Huberman, 1994). Hence, the first step in this thesis was to condense the answers from the interviews and identify key statements to categorize them into different categories and sort them into tables, which will be shown in Chapter 4 Empirics. Key statements were then highlighted to compare the answers and thus, were set as a starting point for the next phase of the analysis.

***Cross-case analysis***

The data from the first phase, within-case analysis, serve as a base for the next step in the analysis, cross-case analysis. A cross-case analysis is a process where commonalities and differences are compared, as well as common themes and trends are identified. The commonalities and differences between the answers from the companies in terms of e-retailers' views on sustainability as well as their knowledge about it are key factors in understanding the choices behind e-retailers' decisions in choosing which sustainable delivery options to offer their customers. Furthermore, the similarities between the companies can give further insight into common characteristics and highlight meaningful connections between e-retailers in the

industry (Khan & VanWynsberghe, 2008; Miles and Huberman, 1994). The findings from the within-case analysis were then cross-checked with the conceptual framework in Figure 2.8.

***Analysis of primary and secondary data***

The third phase of the data analysis was to compare the findings from the cross-case analysis with the theory from the literature study and the data from the interview with the lawyer, Gunilla Welander. This covered all topics in the thesis. The respondents' definitions of sustainability terms and environmentally sustainable last-mile deliveries were compared to the definitions found in the literature study. They were compared regarding whether the respondents' definitions were similar to the ones found in theory and if any patterns could be found. The environmental impact of last-mile deliveries from theory was then compared with how the LSPs are operating in Sweden, the type of fuel and vehicle they are using, and how this information is used by the e-retailers. Further, the communication of environmental sustainability from the e-retailers was compared with the findings from the literature study and interview with Gunilla Welander regarding the marketing regulations and legal implications of the topic. The factors identified in the conceptual framework were also further explored in terms of similarities and differences from the cross-case analysis in combination with the findings from the literature study.

***Forming propositions***

Lastly, propositions were created to address every topic and factor explored in the analysis. The propositions formed were inspired by the CAMO format, a method developed by Romme and Dimov (2021). The CAMO format is context-agency-mechanism-outcome, and its main benefit is that it bridges prospective and retrospective knowledge, something that was relevant for the propositions formed in this thesis since they were based on the current situation, theory, and suggestions for future improvement. The propositions will be part of this thesis' theoretical contribution to e-retailers. When all propositions were formed, they were grouped and categorized according to the common main themes.

## 3.4 Ethics

Bryman and Bell (2017) discuss four ethical aspects that should be addressed when conducting a study. The four aspects are the information requirement, the consent requirement, the confidentiality and anonymity requirement, and the utilization requirement, which will be further discussed below.

***The information requirement***

The information requirement refers to the fact that the researcher must not give out false and/or misleading information regarding the study and must inform what the study's goals and content are (Bryman & Bell, 2017). All the information that the respondents have received regarding the study has been received both during the first contact and during the introduction of the interview. Each respondent has received the same information, and in the event of ambiguities, there has been an opportunity to clarify the information that has been given out. Hence, there is no doubt that this aspect has not been fulfilled.

***The consent requirement***

The consent requirement refers to all participants in the study being aware that participation in the study is voluntary (i.e., each participant has the right to cancel their participation) (Bryman & Bell, 2017). At first contact and in the beginning of the interviews with all respondents, it was made clear that participation in the study was voluntary. It was also made clear that no personal information would be given out and that everything would be anonymous.

***The confidentiality and anonymity requirements***

The confidentiality and anonymity requirements highlight that all information that respondents give out must be treated with high confidentiality so that no unauthorized person gets hold of the data (Bryman & Bell, 2017). No unauthorized persons have been allowed to take part in the transcription and analysis of the data material from the interviews. This is to be able to ensure the anonymity of the people and the company. The interview questions that were asked were only related to the themes of the study and thus, there were no questions that concerned private information. Furthermore, it has been ensured that the results of the study have not been able to be linked to specific companies and/or individuals who participated in the study.

***The utilization requirement***

The fourth and final ethical requirement that Bryman and Bell (2017) address is the utilization requirement. This means that all personal data that is collected may only be used for the study. All data and information that the study has processed has been restricted so that those who participate are anonymous and the data is only used for the study.

## 3.5 Credibility and Validity of the Method

The trustworthiness of research can be ensured in several ways. Conventional research quality assurance methods usually refer to the concepts of validity, reliability, external validity, and objectivity (Halldórsson & Aastrup 2003). Halldórsson and Aastrup (2003) suggest the four dimensions of trustworthiness as credibility, transferability, dependability, and confirmability as an alternative that is more relevant for research in the logistics discipline. These are specifically suggested for qualitative research methods, which makes them applicable for ensuring the research quality of this thesis. Below, the four criteria will be further defined and discussed.

***Credibility***

Halldórsson and Aastrup (2003) mean that reality only exists in and is constructed by the particular context of the respondents' minds. Credibility is determined by the degree of correlation between these constructions of reality and how they are represented by researchers. In other words, the reality of the respondent will affect the perception of the researcher's description of reality and thereby its credibility (Halldórsson & Aastrup 2003). This means that the credibility of the findings of this thesis will depend on the respondent's view of reality.

***Transferability***

The transferability of research can be compared to the conventional term external validity, which refers to the extent to which the study can generalize about the world. Research findings are not always generalizable, as they are highly dependent on the time and space of the event (Halldórsson & Aastrup, 2003).

***Dependability***

The third criterion of dependability is related to the conventional term reliability. It is believed that the stability of the findings over time means that a replication of the research would result in a similar measurement. Due to this, reliability is, in the conventional view, highly dependent on a constant and well-documented methodology (Halldórsson & Aastrup, 2003). In this thesis, this emphasizes the importance of the method being able to withstand the influence of coincidences during the interview situation. This means that variables must always be constant. By having the method defined rigorously and standardized, the probability of obtaining acceptable reliability increases (Lekvall & Wahlbin, 2001). The interview guide has been designed in as standardized a manner as possible, where the questions are easy to understand and are linked to the purpose and theme of the study. When the respondent understands each question, the tendency to repeatedly give equivalent answers increases. This, in turn, increases the reliability of the study.

***Confirmability***

The final dimension of trustworthiness is confirmability, which can be compared to the conventional criterion of objectivity. The researcher has no bias in the findings, they are solely the results of the research. All findings, conclusions, interpretations, and recommendations can be confirmed by data and traced back to their sources, which can be accomplished with a conformability audit (Halldórsson & Aastrup, 2003). For our research, this means that all findings and conclusions are solely based on the collected theory and data presented in the thesis.

# 4. Empirics

*This chapter will describe the empirical findings of the data collection. Firstly, marketing regulations will be described more in-depth based on an interview with a lawyer. Secondly, the participating companies will be presented with a short description of how they work with sustainability. In addition, the data that was collected from the interviews will be presented according to the two themes that were found in the literature review: sustainability and decisions regarding environmentally sustainable deliveries. The empirics will then be concluded with the participating companies' views on the factors that affect their decisions on offering and communicating environmentally sustainable last-mile delivery options.*

## 4.1 Marketing Regulations

E-retailers are bound by laws that directly impact their online retail store, and every company must abide by certain regulations and laws. Hence, knowing the regulations is essential for protecting a company's assets and brand. To get insights into Sweden's marketing regulations, an interview with Gunilla Welander was conducted. Welander described what The Marketing Act means, what responsibility e-retailers have when they use sustainability terms at the check-out, and what liability e-retailers who signed the industry agreement have.

According to Welander, The Marketing Act applies to all marketing, including marketing that regards last-mile delivery and thus, the terminology that is used in the e-retailers' check-outs. An e-retailer that uses environmental claims in its marketing (e.g., *fossil-free, carbon offsetting, environmentally friendly*) must be able to validate the claim and hence, have the necessary evidence to substantiate the environmental claims upon request. If the e-retailer cannot do so, the claim is considered to be misleading. A claim can also be misleading if it is considered to be misunderstood by the average customer, even though the information about the claim is correct. The average customer cannot be expected to know the significance or importance of various certifications, labeling systems, environmental terms, or what environmental benefits are intended when claims are made. E-retailers must therefore inform the customer about the meaning of the claim in question. Following this, it was mentioned in the interview about the initiative from Aster regarding the industry agreement for fossil-free delivery. Welander points out that that agreement was made to have uniformity in the check-outs and would make it easier for the customer to make an informed decision about the delivery option. However, the industry agreement still requires the e-retailer to validate the correctness of the environmental claims from the LSP and provide information to the customer about the definition of fossil-free delivery. If neither a validation nor information about the claim is made, then Welander emphasizes that there is a risk for the e-retailer to be convicted in court since the e-retailer has a contributory liability for the claims made by the LSP. This would result in the brand being denigrated and thus, the customer may both purchase goods from another e-retailer as well as choose another LSP at the check-out.

## 4.2 Mapping of Swedish E-retailers

The mapping of the Swedish e-retailers was made to provide a holistic picture of the current situation of sustainable last-mile delivery options for e-retailers in Sweden. Thus, get an understanding of which e-retailers do and do not offer sustainable delivery options. The selection for the mapping was made based on the 100 largest e-retailers in Sweden in 2021, and after the requirements of material package deliveries and the possibility to order as a private person, the number of e-retailers was down to 72 e-retailers of interest. Out of these, 25 e-retailers used sustainability terms for delivery options in the check-out when the delivery address was set to Lund. The e-retailers were further divided according to which sector they belong to, all e-retailers that belonged to a sector that consisted of only themselves or one more e-retailer were placed in the "*other*" category. The most frequent use of sustainability terms by e-retailers was in the beauty sector, where all e-retailers had at least one delivery option with a sustainability term. Furthermore, in the beauty and other sectors, there is only one e-retailer that provides any information in immediate connection to the sustainability term that they decided to use. The number of e-retailers in each sector, how many e-retailers use sustainability terms, how many have any clarification of the sustainability claims, and the percentage of this can be seen in Table 4.1.

***Table 4.1:*** *Overview of e-retailers' use of sustainability terms at the check-out.*

| Sector | # of e-retailers | # of e-retailers with sustainability terms | % of e-retailers that use sustainability terms | # of e-retailers with clarification of the claim | % of e-retailers with sustainability terms that have any clarification of what the claim means |
|---|---|---|---|---|---|
| Home & House | 16 | 1 | 6.2% | 0 | 0 |
| Fashion | 18 | 7 | 38.8% | 0 | 0 |
| Beauty | 8 | 8 | 100% | 1 | 12.5% |
| Other | 30 | 9 | 30.0% | 1 | 11.1% |
| **Sum** | **72** | **25** | **34.7%** | **2** | **8.0%** |

From the mapping, it could be seen that there were four common terms e-retailers use to describe a last-mile delivery option as sustainable and that some e-retailers use different terms for their delivery options, which is why the number of sustainability terms used is greater than the number of companies. These four terms became the basis for assessing the level of knowledge of sustainability among e-retailers. All the terms that were used and their frequency can be seen in Figure 4.1.

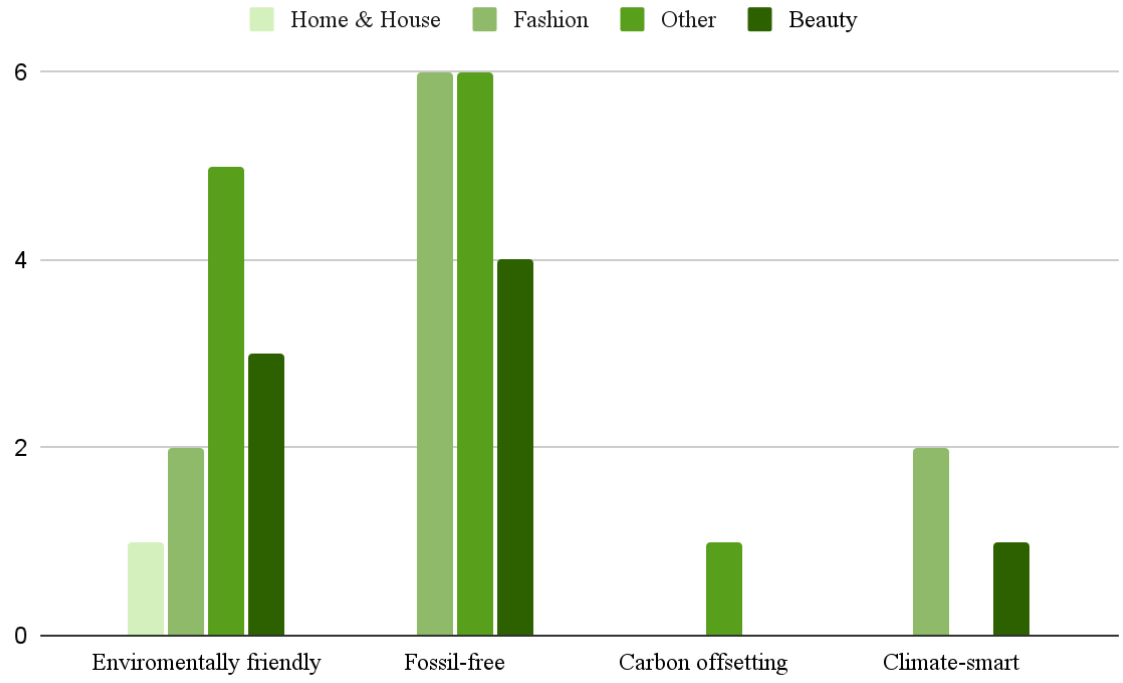


***Figure 4.1:*** *The four most common sustainability terms used and their frequency.*

Carbon offsetting does not reduce an e-retailer's root cause of $CO_2$ emissions, but it can still be a way for an e-retailer to reduce its overall carbon footprint that would otherwise not have been compensated. Hence, there is disagreement about whether carbon offsetting can be viewed as something positive or negative. Table 4.2 presents how many e-retailers in Sweden use carbon offsetting for their last-mile deliveries and how many of them highlight it in the check-out.

***Table 4.2:*** *The number of mapped e-retailers in each sector that use carbon offsetting and the number of companies that highlight at the check-out.*

| **Sector** | **# of e-retailers within the sector** | **# of e-retailers using carbon offsetting** | **% of e-retailers that use carbon offsetting** | **# of e-retailers that highlight carbon offsetting in the check-out** |
|---|---|---|---|---|
| Home & House | 16 | 5 | 31.5% | 0 |
| Fashion | 18 | 6 | 33.3% | 0 |
| Beauty | 8 | 3 | 37.5% | 0 |
| Other | 30 | 6 | 20.0% | 1 |
| **Sum** | **72** | **20** | **27.7%** | **1** |

## 4.3 Company Description

The mapping gave an overview of the companies that were of interest to interview, which concluded that six companies wanted to participate. In Table 4.3, a summarized presentation of the interviewed companies can be seen. The following chapter will describe the general background of the participating companies and how they view sustainability. It should be noted that we only interview one respondent from each participating company, which is why there can be discrepancies between the actual situation at the company and the respondents' answers. In addition, the statements made are not our analysis or insights but were mentioned by the respondents.

***Table 4.3:*** *Summary of the participating companies.*

| | **Alpha** | **Beta** | **Gamma** | **Delta** | **Epsilon** | **Zeta** |
|---|---|---|---|---|---|---|
| **Turnover (MSEK) (2021-12)** | 1000 | 4000 | 2100 | 678 | 400 | 2790 |
| **# of employees** | 100+ | 900 | 1000 | 80 | 100+ | 500 |
| **Industry** | Fashion | Pharmaceutical | Beauty | Beauty | Fashion | Books |
| **Companies' view on sustainability** | "We try to consider the triple bottom line when we think about sustainability." | "We value sustainability very highly, and it is a big part of our branding." | "We take our sustainability responsibility and make it a part of our social responsibility." | "It is important, and if we are to survive, we must become better at sustainability." | "We are very keen on sustainability and environmental work." | "We try to work with sustainability in every part of the company." |
| **Industry agreement** | No | Yes | No | No | No | Yes |
| **Carbon offsetting** | Yes | No | No | No | No | Yes |

### 4.3.1 Alpha

Alpha is a family-owned company in the fashion industry that was founded by the respondent and his brother. They took over their parents' store in Kalmar and turned it into an e-retail, which has over 100 employees and a turnover of 1000 MSEK a year as of 2021. The interviewed respondent works as a Brands and Sustainability Manager, where the respondent's main task is to develop the company's brands and is responsible for sustainability questions within the company.

When sustainability is considered, the company tries to contemplate the triple bottom line (i.e., environment, economy, and social) and integrate this with the United Nations' 17 Sustainable Development Goals, where all parts should be included. Hence, sustainability is considered important for the company, its owners, customers, and employees. Resulting in visions, goals, and KPIs to drive the sustainability questions forward and minimize their carbon footprint to be a role model in the industry. However, the company uses carbon offsets and does not use

any terminology for sustainable last-mile delivery. The reason for this is that certain terminology needs to be defined as well as validated, and the company cannot optimally do that. In addition, the respondent emphasizes that before the pandemic, the sustainability work was self-evident, and now it is believed it has gotten more polarized where politics is more embedded in it. This communicates that sustainable last-mile delivery is still an immature process where purchase, sale, and marketing instead drive the business forward, and sustainability issues come subsequently.

### 4.3.2 Beta

Beta was founded in 2012 and has rapidly grown within the pharmaceutical industry since then. The company has won various awards, including several sustainability awards, for its ambitious sustainability work. The interviewed respondent has worked at Beta for two years as a Head of Freights and Business Developer.

The company values sustainability very highly, and it is a large part of its branding. Like many others, they divide sustainability into three different parts that make up the triple bottom line. Hence, the company tries to incorporate sustainability both in its branding and corporate culture, which makes the company constantly push itself, its suppliers, and its customers to make more sustainable choices in everyday life. Beta tries to be at the forefront of various sustainability initiatives, and one initiative is its recent investment in electrified transport, which can reduce its climate impact. The respondent highlights that sustainability has gone from being a bonus for companies, as well as a bonus from a customer's perspective, to becoming more of a requirement to still be competitive in the market. However, the respondent emphasizes that many companies use diffuse terminology for sustainability, especially for sustainable last-mile delivery. This is the reason Beta signed the industry agreement regarding fossil-free delivery. Despite this, the company does not validate the sustainability terms, but the respondent says that they do sometimes visit the LSPs.

### 4.3.3 Gamma

With a turnover of 2100 MSEK and 1000 employees, Gamma is one of the Nordics' leading beauty e-retailers. The company aims to be a pioneer in the beauty industry by offering the widest range of products and the best customer experience. The interviewed respondent has worked at Gamma for almost two years and is responsible for the delivery and shipping processes. Furthermore, the respondent has extensive knowledge and understanding of their supply chain.

Sustainability has increasingly been recognized as an important factor for e-retailers and is, for many companies, seen as a competitive advantage. This has made Gamma's environmental responsibility a part of its social responsibility instead of making sustainability a selling point. In addition, the company tries to accelerate its work on minimizing its carbon footprint and be at the forefront of having sustainable solutions to show the rest of the e-retailers that it is possible, and the respondent emphasized: *"If we can do and solve this, you should be able to do it too"*. Since interest in sustainability has significantly increased, the company conducted

a survey where they asked their customers what they prioritized when choosing an LSP for the check-out. The survey showed that customers point out the importance of sustainability and want sustainable delivery options. However, based on the company's statistics of which delivery option is the most selected one, the customers would rather choose a free delivery option, and thus, the respondent highlights that *"sustainability does not drive sales"*.

### 4.3.4 Delta

Delta was one of the first e-retailers in Sweden within the beauty industry and has since started to expand its presence and range on the Nordic market. Today, the company is one of the leading beauty stores in the Nordics in make-up, perfume, skincare, and haircare. The interviewed respondent is the Director of Logistics and has extensive knowledge and experience in supply chain management, business development, and project management.

The respondent started by underlining that sustainability is important, but the company needs to become better at working on how to become more sustainable. This is pointed out in their view of sustainability. *"It is important, and if we are to survive, we must become better at sustainability"*. The company does not have any major branding around its environmental responsibility on its website, and thus, sustainability branding is not its highest priority. However, the respondent continues and says that they are well aware of the environmental impact and that the company has the ambition to include the environmental impact of their everyday lives. In addition, the company complies with current environmental regulations and laws. Despite that, the company does not validate its environmental claims and thinks *"it is difficult to validate the LSPs, so I trust that they do what they say"*.

### 4.3.5 Epsilon

Epsilon has a selection of luxury and premium fashion brands where sustainability and quality are in focus. The company has over 100 employees and a turnover of 400 MSEK. The respondent has worked for approximately four years at Epsilon and is responsible for the company's logistics and business development. Furthermore, the respondent has over 10 years of logistics-related experience.

The interviewed company thinks sustainability and working actively on sustainability issues are highly important. The respondent emphasizes that there will be stricter requirements for sustainability reporting, and this will likely become true in a few years. Sustainability is considered widespread throughout the company, from customer experience to shipping to delivery. As of today, the company does not give out any information regarding sustainable last-mile deliveries at the check-out since they consider the information to be redundant. The information is instead given on a landing page where they collect all sustainability questions, and this is where customers can read about the LSPs' sustainability work. However, the company does not validate the correctness of the given information from the LSPs; instead, the company asks the LSPs to have a sustainability pitch, and thus, the company gets a quick overview of how the LSPs work with sustainability.

### 4.3.6 Zeta

The Nordic countries' largest online bookstore is active in 12 countries, with its base in Sweden. The company was a pioneer in e-retailing and now has 500 employees with a turnover of 2790 MSEK. The respondent works as a Head of Delivery and is responsible for customer experience and transport procurement. In addition, the respondent has several years of experience in the logistics field.

Zeta was one of the first companies to sign the industry agreement regarding fossil-free delivery, which aims to create rigor in e-retailers' check-outs. However, the company does not validate the correctness of the environmental claims; instead, they are confident that the claims made by the LSPs are supported with facts and hence, *"take their word for it"*. The respondent points out that they *"try to work with sustainability in every part of the company"* and want to be an active force in the industry's sustainability work as they work to reduce the GHG emissions they generate, which is why they use carbon offsetting. However, the respondent highlights that carbon offsetting should only be done for a short period; otherwise, it can be seen as some form of greenwashing.

## 4.4 E-retailers' Delivery Options

After introducing the company description and how they view sustainability, the e-retailers' delivery options will be outlined. The structure of the conceptual framework and the literature review will be followed to present the result. To get a better insight into the e-retailers' decisions on their offered LSPs, an overview of the most common LSPs for last-mile delivery in Sweden is presented in Table 4.4. For every company, the offered delivery options are listed, as are the types of vehicles or fuels they use. The information about the LSPs' vehicle fleets and the companies' sustainability work is based on information presented on their websites, which is why, depending on what they choose to publish, the type of sustainability work varies between the companies.

***Table 4.4:*** *The most common LSPs for last-mile deliveries in Sweden.*

| Company | Delivery options | Sustainability work | 100% fossil-free? |
|---|---|---|---|
| Budbee | Box, home delivery | All vehicles run on HVO100 or electricity (Budbee, n.d.). | Yes |
| Instabox | Box | All vehicles run on fossil-free fuels, e.g., HVO (Instabox, 2023). | Yes |
| Postnord | Box, home delivery, service point | Transitioning to renewable fuels and green energy (Postnord, 2023). | No |
| DB Schenker | Home delivery, service point | Transitioning to renewable fuels and green energy, 36 % biofuels in 2021 (DB Schenker, 2021). | No |
| DHL | Home delivery, service point | 45 % fossil-free fuels (DHL Freight, 2023) | No |
| Airmee | Box, home delivery | 100 % carbon neutral deliveries. 41 % electric vehicles, 59 % run on fossil-free diesel (Airmee, 2023). | Yes |
| Early Bird | Home delivery | 50 % of last-mile deliveries are fossil-free (Early Bird, 2023). | No |
| Bring | Box, home delivery, service point | Electrifying their vehicle fleet and transitioning to using fossil-free fuels (Bring, 2023). | No |

All of the mentioned LSPs for last-mile delivery in Sweden will negotiate with the person(s) at the e-retailer involved in the decision of which LSPs are contracted. Negotiation is a crucial part of helping e-retailers find LSPs that fit their business case and can streamline the supply chain. Hence, the responsible person for the contract between LSPs and the e-retailer has an important role. The summary of who is involved in the decision about which LSPs are contracted is presented in Table 4.5. At Zeta, Epsilon, and Gamma, the responsible person for handling the contracts and communication with the LSPs is the respondent. The respondent at the three different companies determines if the delivery option fits their material flows and if it is a good match with their business. At Delta, the respondent, together with people from

marketing and sales, is involved in the decision regarding which LSPs to contract. Whereas at Beta, the CEO and the management team are in charge of making the decisions regarding which and how many LSPs are contracted. The management team is also in charge of the decisions at Alpha, where the team evaluates and determines which LSPs are the most interesting to focus on.

***Table 4.5:*** *Summary of who is involved in the decision of which LSPs are contracted.*

| | **Alpha** | **Beta** | **Gamma** | **Delta** | **Epsilon** | **Zeta** |
|---|---|---|---|---|---|---|
| **Management team** | • | • | | | | |
| **External Logistics Lead** | | | • | | • | |
| **Head of Delivery** | | | | | | • |
| **Director of Logistics** | | • | | • | | |
| **CEO** | | • | | | | |
| **Marketing & Sales** | | | | • | | |

A full mapping of the LSPs that the e-retailers offer in Sweden can be seen in Table 4.6. Instabox and Postnord, two of the biggest actors in last-mile deliveries in Sweden, are offered by all companies. How many and which LSPs the companies offer last-mile deliveries with in addition to those two varies. All companies except Gamma had customer satisfaction and cost as the main deciding factors, whereas Gamma was the only one that had requirements on environmental sustainability that had to be fulfilled before an LSP was even considered to be offered. The reasoning behind the decisions of all companies is further developed below.

***Table 4.6:*** *Summary of which LSPs the participating companies have contracts with in Sweden, and an asterisk (i.e.,*) marks the LSPs the participating companies have contracts with in Lund.*

| Delivery option | | Alpha | Beta | Gamma | Delta | Epsilon | Zeta |
|---|---|---|---|---|---|---|---|
| **Home delivery** | Postnord | ● | ● | ● | ● | ● | |
| | Early Bird | | ● | ● * | | | ● * |
| | CityMail | | | ● | | | |
| | Best | | ● * | | | | |
| | Airmee | | ● | | | | ● * |
| | Budbee | | ● * | ● * | | ● * | |
| | Premo | | ● | | | | |
| **Parcel locker** | Instabox | ● * | ● * | ● * | ● * | ● * | ● * |
| | Budbee | ● * | ● * | ● * | ● * | ● | |
| | Postnord | ● * | ● | | ● | ● | |
| **Service point** | Postnord | ● * | ● * | ● * | ● * | ● * | ● * |
| | DHL | | ● | | | | |
| | Schenker | | ● | | | | ● * |

Zeta and Beta have both chosen to offer delivery options that can satisfy the needs of many types of customers, resulting in a specific, curated selection of last-mile delivery options. Beta has contracts with nine different LSPs. Postnord, Schenker, and DHL are the big, old-school LSPs, as the respondent described them. For mailbox delivery, they have Early Bird and Premo, which operate in different regions. Premo delivers in the Stockholm region, and Early Bird covers the rest of Sweden. On top of these, Beta also offers deliveries with Best, Aimee, Instabox, and Budbee. Zeta, on the other hand, has different LSPs for different delivery options. For delivery to a service point, they have contracts with Postnord and Schenker, Instabox for box deliveries, Early Bird for home delivery in the mornings, and Airmee for home delivery in the evenings. The respondent from Zeta explained that they have divided the customers into three main segments regarding last-mile delivery: customers in a rush, customers who want a comfortable option, and price-conscious customers. What is a comfortable option may vary from customer to customer; for some, it is to have the parcel delivered with their morning newspaper; for others, it might be to pick it up in a box at their grocery store. Ultimately, it was also the cost of the different options that determined which ones Zeta decided to use, said the respondent. As their products are priced with a low margin, the cost of delivery has a big impact on the total costs for the customers.

Beta explained that they have two main reasons for offering last-mile deliveries from multiple LSPs: a promise to the customer and a strategic commercial move. Customers have previous experiences with the different LSPs, which can be both negative and positive, that will influence why they might prefer one company over another. By offering many options, Beta, therefore, increases the possibility of offering the option every customer prefers. Having multiple LSPs in combination with Beta's size and market share also gives them an advantage in negotiations. By doing this, the LSPs are in competition with each other, which works to Beta's benefit as it can lead to, e.g., lower prices or shorter delivery times. They are also less sensitive to tough requirements from the LSPs, which could damage their collaboration.

Alpha, Epsilon, and Delta all offer last-mile deliveries from the same three LSPs: Instabox, Budbee, and Postnord. The three companies offer all available delivery options from the LSPs. Epsilon reasoned that once they are working with an LSP, they might as well utilize all their delivery options, as they are already sending parcels through that channel. Previously, Alpha offered last-mile deliveries with Postnord only, but they had a theory that customers wanted multiple options, which led them to start looking at other options. Epsilon and Delta reasoned similarly when choosing LSPs, both with price and customer benefits as their main focus. The respondent from Delta explained that it is important for them to have a broad offer of alternatives—something that satisfies every customer. Some options might be cheaper but slower, and vice versa.

The main principle for Epsilon is to always offer a standard alternative and one premium alternative. Another factor that weighs in on the decision of whether Epsilon should work with a certain LSP or not is the size of its network and how it is expanding in the market. The expansion of Instabox's box locations has led to benefits for Epsilon too, and for home delivery, Postnord reaches a bigger part of Sweden than Budbee, while Budbee has a great network in the bigger cities. Sustainability is a factor that does not affect Delta's choice of LSPs that much, as the respondent means all LSPs present themselves as very sustainable, and there is not a big difference. External factors that influence which LSPs Delta works with are the different delivery options other e-retailers offer, which LSPs, which delivery methods, and at what price. They are constantly benchmarking against competitors to make sure Delta is also offering attractive delivery alternatives. The respondent from Delta emphasized that in the end, everything comes down to the price of the delivery, although it has to be in balance with the perceived quality of the LSP's delivery options. If Delta is offering a delivery option that the customer is paying for, the customer must be receiving the service they paid for.

Gamma has a strategy that differs from the other companies interviewed. Similarly, to the other companies, they offer deliveries from multiple different LSPs: Postnord, Instabox, Budbee, Early Bird, and CityMail. They make this decision based on several factors, but there is one requirement the LSP must fulfill to be offered by Gamma: they must have a fossil-free delivery. This disqualifies several LSPs, the respondent explained. Gamma has also adapted this on a regional level based on where the LSPs can provide fossil-free delivery. A while ago, they stopped offering deliveries with Postnord in some regions of Sweden as a fossil-free delivery could not be guaranteed there. Of the markets Gamma operates in, Sweden is the one that has

come the furthest in terms of sustainable last-mile deliveries, which means they can have stricter requirements in that market, according to the respondent. The respondent reasons that putting pressure on the LSPs this way can also help push the sustainability work in the entire market forward. For the LSPs that meet the environmental requirements, it is the cost that determines whether a delivery option is attractive for Gamma to offer or not. The respondent says that, in the end, every business needs to be profitable. One of the benefits of having multiple LSPs, combined with the size of Gamma, is that it leads to internal competition among the LSPs, which can push down prices and delivery times. If they are to add a new LSP or delivery option, it has to offer new customer value.

### 4.4.1 Key Take-aways

The key take-aways from e-retailers' delivery options can be seen in Table 4.7 below.

***Table 4.7:*** *Key take-aways from e-retailers' delivery options.*

| | |
|---|---|
| **The most common LSPs in Sweden** | • Instabox, Budbee, and Postnord |
| **The person(s) involved in the decision about which LSPs are contracted** | • See Table 4.5. |
| **The LSPs the participating companies have contracts with** | • See Table 4.6. |
| **Environmental sustainability of LSPs today** | • Instabox, Budbee, and Airmee claim to be 100% fossil-free.<br>• The remaining discussed LSPs (see Table 4.3) are fossil-free to varying degrees, with many of them working towards goals of being 100% fossil-free. |

## 4.5 Factors for Given Information About Sustainable Deliveries

With the company description and their delivery options presented, we will now cover factors that influence the given information about sustainable last-mile deliveries. All five factors in the conceptual framework will be discussed. Firstly, the knowledge regarding sustainability and sustainable last-mile delivery options from the participating respondents will be presented. Secondly, what terminology is used, how it is presented, and the reason for e-retailers to communicate the information regarding sustainable last-mile delivery options are discussed. Then there is a presentation of how there is no comparable measurement for $CO_2$ and that some e-retailers are afraid of greenwashing. Lastly, the competitive aspect of the LSPs at the check-out is discussed.

### 4.5.1 Lack of knowledge

The first factor that influences what information is given regarding the environmental impact of last-mile deliveries is the general level of sustainability knowledge in the company. The

employees' knowledge level is an important part of ensuring the longevity of the sustainability work of the company's operations on the global market. Hence, if the company decides to work with and prioritize sustainability issues, then it will permeate the whole company and impact the employees' knowledge for the better. In Table 4.8, a summary of the respondents' assessed sustainability knowledge of the company and their definition of sustainable last-mile delivery is shown.

***Table 4.8:*** *Summary of respondents' assessed sustainability knowledge and definition of sustainable last-mile delivery.*

| | **Alpha** | **Beta** | **Gamma** | **Delta** | **Epsilon** | **Zeta** |
|---|---|---|---|---|---|---|
| **Assessed general knowledge among employees** | Mixed | High | Mixed | Low | High | High |
| **Definition of sustainable last-mile delivery** | "Electrifying the vehicle fleet and expanding the box pick-up network, so they are close to residences and delivering the parcels there." | "A delivery that fulfills sustainability in all three dimensions /.../ and also achieves sustainable quality in each dimension." | "The right balance of the use of resources /…/ well-filled vehicles with socially sustainable drivers that are run on a sustainable fuel that can be used for 20 more years." | "A fossil-free and, in the broadest sense, sustainable delivery at the right time and in the right place." | "The focus should always be on the fill rate." | "A delivery that is well-planned and well-filled, fueled by the best possible fuel at that moment, and with an employed driver that has fair working conditions." |

Alpha has a virtual team working on sustainability questions at the company. The respondent emphasizes that the knowledge of sustainability is very high in the dedicated sustainability team, which the respondent is a part of. In other departments of the company, the respondent believed the level of knowledge to be more varied and that it largely depended on the field of interest of the employees. However, the respondent hoped that the knowledge would spread to employees in other departments. Like Alpha, Gamma assessed the level of sustainability knowledge to be mixed among employees, with some people being very educated and therefore setting the internal requirements. The respondent thought most employees had some base level of understanding of sustainability and how it could be applied in their work, but when it came to more specific topics, e.g., biofuels, most employees would not be well informed.

Epsilon, Zeta, and Beta assessed that the general knowledge of sustainability among employees is high. Both Zeta and Beta have a dedicated sustainability department that works primarily with environmental as well as social sustainability, and the respondents both emphasize that it is a crucial topic for the future of last-mile deliveries. The social aspect of sustainable last-mile delivery is shown when both respondents were asked to define sustainable last-mile delivery.

The respondent from Beta meant that a sustainable last-mile delivery is "*a delivery that fulfills sustainability in all three dimensions /.../ and also achieves a sustainable quality in each dimension.*" Whereas Zeta defines it as "*a delivery that is well-planned and well-filled, fueled by the best possible fuel at that moment, and with an employed driver that has fair working conditions".* Following this, it was mentioned that the knowledge and working methods of the sustainability departments spread to other departments within the two companies. In contrast to Beta and Zeta, Epsilon does not have any specific sustainability team, department, or expertise in the area. When they make decisions regarding sustainability or need more knowledge about the area, they either help each other or hire external experts.

There was only one company, Delta, that assessed the general knowledge of sustainability among the employees to be quite low. As the respondent highlighted, the company does not work actively with it, and hence, the respondent does not think the employees have any insights into sustainability or the different terminology. Also, the respondent explains that there are no plans to offer courses or education in sustainability at the moment, and the main reason for this is that other areas are prioritized higher.

Even though the assessed employees' knowledge within the various e-retailers differed as well as how they prioritized and worked with sustainability, they all had different definitions of what a sustainable last-mile delivery is. Some participating respondents emphasize *"knowledge spread throughout the company"*, which is why the assessed knowledge about sustainability was set to be high or mixed. Hence, to be able to specifically compare the knowledge and see how well the knowledge spread throughout the various e-retailers, all respondents were asked to define the four terms *"Fossil-free", "Environmentally friendly", "Carbon offsetting",* and *"Climate-smart"* without preparation. Table 4.9 presents the respondents' definitions of the four common sustainability terms used in check-out for last-mile delivery.

***Table 4.9:*** *Respondents' definitions of common sustainability terms.*

| Term | This thesis' definition | Alpha | Beta | Gamma | Delta | Epsilon | Zeta |
|---|---|---|---|---|---|---|---|
| **Fossil-free** | The energy used does not originate from fossil fuels (Sveriges Allmännytta , 2023) . | "I think about fuels. For example, a truck is electrified, or biofuels are fossil-free." | "Deliveries that do not use fossil fuels." | "Do not use any component that cannot be produced by renewable processes." | "The energy used does not have an origin that is based on non-renewable energy or electricity (e.g., coal)." | "You use fuel that is not combusted." | "Vehicles powered by fuels that do not contain fossil substances." |
| **Environmentally friendly** | It is not harmful to the environment (Cambridge Dictionary, 2023). | "A hopeless word." | "Products and services that do not harm the environment ." | "No, you cannot define it. /…/ However, it can signal to consumers that if you have to make a choice, you should make this choice if you want to think about the environment ." | "To be friendly to the environmen t and be sustainable as well as fossil-free." | "Making as little impact on the environment or the earth as possible." | "A better option for the environment than the traditional one." |
| **Carbon offsetting** | The reduction of emissions made in order to compensate with the same amount elsewhere (Naturskydd sföreningen, 2023). | "For example, we use the market and compensate by planting trees." | "Achieve +- 0 carbon footprint." | "Cause harm in one place and do some good in another place." | "You pay to be free." | "A way to compensate for your negative impact." | "For a short period, give money for environment al work when you, as a company, have not reached all the way." |
| **Climate- smart** | Strive to counteract the deterioration of the climate (Svenska Akademiens ordlista, 2015). | "It's a fuzzy word, and it's stupid to use." | "Delivering a product and a service that benefits the environment and the climate." | "To use as few resources as possible in the first place." | "It is difficult to define. If you find a way to use it to your advantage, then you are climate-smart." | "Protect nature. /.../ I think it is about circular economy and circular product use." | "Make wise decisions that have a smaller climate impact than what you did yesterday." |

### 4.5.2 Terminology

The second aspect the interviewed companies mentioned that impacts their information regarding sustainable last-mile delivery is terminology. E-retailers offer limited information about the consequences of the delivery options and the terminology that is being used, which means that different sustainability terms can mean different things depending on the company, and thus, how the different delivery options are presented to the customer at the check-out varies between the different e-retailers. Table 4.10 is a summary of the sustainability terms used and the reason for any potential description of the environmental impact of the last-mile delivery option.

***Table 4.10:*** *Summary of which terms are used and reason for any potential description of the environmental impact of a last-mile delivery option.*

| | **Alpha** | **Beta** | **Gamma** | **Delta** | **Epsilon** | **Zeta** |
|---|---|---|---|---|---|---|
| **Sustainability terms used** | - | "Fossil-free", "Environment" | "Fossil-free" | "100% Fossil-free" | - | "Fossil-free" |
| **Validation of sustainability terms** | - | No | Yes | No | - | No |
| **Reasons for (not) communicating sustainable last-mile delivery** | "We cannot confirm the claims and do not want to be accused of greenwashing." | "It is something we ourselves value highly, and presenting an LSP as fossil-free becomes more attractive to the customer." | "It is a means of communication to drive development forward." | "Nothing stops us from telling you that it is fossil-free. However, it is difficult for customers to know that an LSP is fossil-free all the way." | "We do not want to overload the customer with information." | "We have written it out for those who live up to it 100%." |

Both Alpha and Epsilon have chosen not to use any terms to describe the sustainability of different last-mile delivery options at the check-out. Alpha means that the reason behind this is that Alpha cannot confirm these claims. Epsilon emphasizes that the reason they do not give out any information about the environmental impact of different last-mile delivery options is that they do not want to overload the customer with information at check-out. The only situation in which they mention the environmental impact of a last-mile delivery option is air freight, which is only available in the German market. There, they explicitly inform the customer that they can save 90% of their GHG emissions by instead choosing road freight. They do this both for environmental and financial reasons, the respondent explains, as air freight is much more expensive for both the customer and Epsilon. The one who has the responsibility for the presentation of last-mile deliveries at the check-out is the Manager of Online Retail, but the decision was made together with the company management, Director of Logistics, Marketing, and the COO. At Alpha, it is the CX manager who is responsible for the presentation of last-mile deliveries.

Delta, Beta, and Zeta do not have any specific direction on which terms to use for the sustainability of last-mile delivery. If an option is marked with a specific term, it is based on the information given by the LSP. The respondent from Delta was not certain if they used terms to describe the environmental impact of all delivery options today or only the ones that are fossil-free. However, Delta only communicates *"100% Fossil-free"* on the delivery option from Budbee and does not have any information regarding the sustainability of Instabox. In addition, none of the three e-retailers validates the sustainability terms that they use. How the delivery options are presented at the check-out is a collaboration between the respondent (i.e., the Director of Logistics), the LSPs, the marketing team, customer service, and the IT team, who are in charge of the technicalities. The respondent receives information from the LSPs on how they want to be presented, e.g., as *fossil-free*, and then the customer service and marketing team has the opportunity to adjust it to fit the brand and appeal to customers.

Both Zeta and Beta have signed the industry agreement and trust that LSPs that have also signed it will fulfill the specified requirements for the phrase *"Fossil-free"*. The respondents from both companies point out that customers generally have less insight into the specific meaning of different terms, which can lead to confusion. In addition, they find it important to communicate to the customer when a last-mile delivery option is fossil-free to show it is something they value as a company. They mean it also becomes an incitement for LSPs to become more sustainable by doing this, as they see it as a competitive advantage. The next step for Zeta is to adapt the terminology to the postal code of the customer; if an LSP offers fossil-free delivery in that area, they want to show it at check-out. Postnord and Early Bird are two LSPs where this would be applicable. The ones who decide which terminology is used in the check-out at Zeta are the Head of Delivery (i.e., the respondent), customer service, and the marketing teams. Following, the individuals who are responsible for the presentation of the last-mile delivery options at Beta are: the sustainability team, and the ones who are responsible for the web page.

Gamma is the only company that has several factors that influence the terminology used in their description of last-mile delivery options. The first one is the unified company image. At Gamma, the terminology used for the last-mile delivery options at the check-out has to be in line with the terminology and image communicated in the rest of the company, for example, in customer service. The purpose of this is to convey a holistic and unified perception of the company to the customer. The LSPs also have some influence in the presentation of the last-mile delivery options in terms of how they are working with sustainability and how they want it to be communicated. The respondent says it is important to have an ongoing conversation with the LSPs to make sure what is communicated to customers is true to reality, and thus, Gamma finds it important to validate the LSPs' claims. Following this, the company has decided to only use one term to describe the sustainability of their options for last-mile deliveries, and that term is *"Fossil-free"*. This decision was made partly to make it easier for customers to understand in which way last-mile delivery is sustainable and partly because it is a term that can be quantified and is less ambiguous. By using *"Fossil-free"* Gamma also wants to show customers that they know and have insights into the environmental impact of their operations. The respondent expressed it as follows: *"I would say, by definition, there is no such*

*thing as environmentally friendly delivery. It is always more or less costly for the environment to make a delivery. So that's why I think, as a person working with sustainability linked to deliveries, environmentally friendly is badly worded. Fossil-free is more concrete."*. The decision to use certain terminology was made by the Head of Communication and Sustainability, Head of Logistics, and External Logistics Lead.

### 4.5.3 No Comparable Measurement for CO2

The $CO_2$ emission is perhaps one of the most important factors to give the customer information about, and it has emerged that the measurement of an LSP's $CO_2$ emission is complicated to set in a way that is both fair and comparable. This is due to the conditions and calculation methodology that differ among the LSPs. Out of the six interviewed companies, two mentioned that there is no comparable measurement for $CO_2$ and cited this as one of the reasons for not using any sustainability terms in the check-out. Both Alpha and Epsilon agreed that the calculations for $CO_2$ emissions differ depending on who the LSP is and that *"No one knows the exact carbon dioxide emission the LSP emits"*. The respondent from Epsilon continues, *"LSPs such as Budbee and Instabox rather talk about their last-mile, since this is where they have full control and can be, allegedly, 100% fossil-free, but they do not talk as much about the first-mile when they pick the packages up at the warehouse."* Furthermore, the respondent from Alpha questioned one of the LSP's $CO_2$ emissions when they suddenly reduced their emissions by 30%, but the LSP could not confidently explain the reason behind it. *"They said they had changed their measurement method. Apparently, all the LSPs have to do to reduce their $CO_2$ emissions is to change their measurement method. This is why it is so easy to communicate that the delivery is fossil-free, but you as an e-retailer or customer do not know if the LSP's last-mile delivery is fossil-free"*. As a result, both Epsilon and Alpha do not trust the stated $CO_2$ emissions from the LSPs.

### 4.5.4 Fear of Greenwashing

A direct consequence of not having a comparable measurement for $CO_2$ emissions, the terminology not being used systematically, and the uncertainty about what the terms mean is that there is no certification or standard for environmentally sustainable last-mile delivery. Hence, there is a risk for e-retailers to be accused of greenwashing if the LSPs do not live up to their sustainability claims. Only 34% of the largest e-retailers in Sweden offer sustainable last-mile delivery. Therefore, the participating respondents were asked what they thought were the reasons why some e-retailers do not offer sustainable last-mile deliveries. Four respondents explained that it depends on whether the management team perceives sustainability as something important, and if not, factors such as price and lead time are prioritized. The respondent from Epsilon continued to explain that *"if you are not profitable, then it does not matter how sustainable you are"*. Following, the respondent from Delta explained that *"to make money out of being sustainable, the concept needs to be a strategic part of the company"*. Whereas the other two respondents explained that an e-retailer has to be of a larger scale to have the bandwidth to be able to work with sustainability issues; otherwise, they have to trust that the LSP does what they say.

Alpha emphasized the risk of greenwashing in the interview. The respondent from Alpha highlighted that they do not have the resources and do not know how to validate the sustainability terms from the LSPs. The respondent explained how some LSPs claim to be *"100% fossil-free"*, but they do not want to present this information as it is not verified by themselves or a third-party actor. The reporting on the environmental impact of the LSPs is, in many cases, too weak, according to the respondent. Hence, if they presented the information, it could go against The Marketing Act and get them accused of greenwashing, which can denigrate their brand, and this is something they do not want to risk.

### 4.5.5 Competitive Aspect

There is a competitive aspect to take into consideration for e-retailers where customers choose the preselected delivery option (i.e., the option at the top of the check-out). The participating respondents all agree that the delivery options at the top of the check-out will be chosen to a greater extent than other delivery alternatives. Hence, when an LSP is placed first, the likelihood of that specific LSP getting the greatest number of orders will increase. Figure 4.2 presents what the participating companies prioritize when determining which LSP is placed at the top of the check-out. All respondents got to rank how their company prioritized LSPs at the check-out. Their most prioritized aspect received 3 points, their second received 2 points, and their least prioritized aspect got 1 point. As can be seen, the participating companies were more likely to have an LSP at the top of the check-out that costs less for the company to use. Perceived quality and the lead time for the customers' packages to get to their final destination are seen as almost as important as the cost. However, sustainability and whether the company has a strategic alliance with the LSP were the least prioritized aspects in the check-out, and hence, those delivery options were more likely to be the ones that were at the bottom of the check-out list. When the question was asked about why the respondents think their customers chose a certain delivery option, four of the respondents said they think their customers want a short lead time with the comfort of a parcel locker. In addition, two respondents said that the customer wants free shipping or an inexpensive shipping option as much as possible.

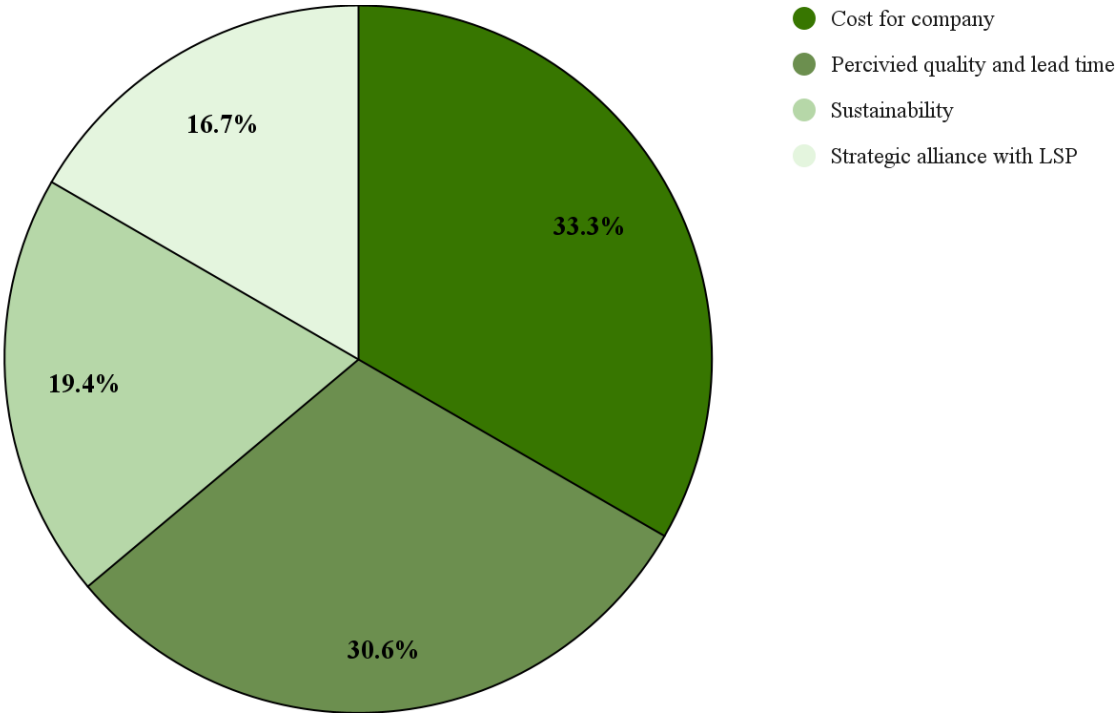


***Figure 4.2:*** *What e-retailers prioritize when determining which LSP is placed at the top of the check-out.*

### 4.5.6 Key Take-aways

The key take-aways from "Factors for Given Information About Sustainable Deliveries" can be seen in Table 4.11 below.

***Table 4.11:*** *Key take-aways from "Factors for Given Information About Sustainable Deliveries".*

| Factor | Key Take-aways |
|---|---|
| **Lack of Knowledge** | ● The assessed employees' knowledge within the various e-retailers differs, as does how they prioritize and work with sustainability.<br>● The definitions of the four common sustainability terms in Table 4.9 highlight that the terms have different meanings for different people. |
| **Terminology** | ● Alpha and Epsilon do not use any sustainability terms in the check-out.<br>● The remaining four companies use *"Fossil-free"*.<br>● The reasons for (not) presenting the sustainability terms differ among the e-retailers.<br>● Only one of the four e-retailers that use sustainability terms validates its correctness.<br>● *"Fossil-free"* was the term that had the most similar definitions among the respondents. |
| **No Comparable Measurement for CO2** | ● Alpha and Epsilon highlight that the calculations for $CO_2$ emissions differ depending on who the LSP is.<br>● An LSP's $CO_2$ emissions can be significantly reduced if its measurement method is changed, which is why it is so easy to communicate sustainability terms. Hence, as an e-retailer or customer, it can be difficult to know if the LSP's claims are correct. |
| **Fear of Greenwashing** | ● Alpha means that the reason they do not use sustainability terms is that they cannot confirm the claims.<br>● LSPs can claim to be *"100% fossil-free"*, but Alpha does not want to present the information as it is not verified by themselves or a third-party actor.<br>• Two respondents explained that an e-retailer has to be on a larger scale to have the bandwidth to be able to work with sustainability issues.<br>● The reporting on the environmental impact by the LSPs is in many cases too weak, and if the terms are used, it could go against The Marketing Act.<br>● Only 34% of the largest e-retailers in Sweden offer sustainable last-mile deliveries. |
| **Competitive Aspect** | ● The least expensive LSP for the e-retailer will most likely be at the top of the check-out.<br>● Sustainability is the least prioritized aspect in the check-out and will most likely be the delivery option at the bottom.<br>● It has been mentioned by two respondents that an e-retailer has to be of a larger scale to have the bandwidth to be able to work with sustainability issues, otherwise, they have to trust that the LSP does what they say. |

# 5. Analysis of E-retailers' Views and Decisions on Sustainable Last-Mile Delivery

*This chapter will analyze how an environmentally sustainable last-mile delivery can be defined and identify the underlying reasons for the factors that influence e-retailers' decisions on offering and communicating environmentally sustainable delivery options. The definition of what a sustainable last-mile delivery is and the factors that influence e-retailers' decisions have been identified through related literature and interviews.*

## 5.1 Marketing Regulations

If a claim creates the impression that a service or product has no impact or a positive impact on the environment, then it is considered an environmental claim. Environmental claims have significant marketing value as customers become more aware of how their consumption habits impact the climate, which is why many companies tend to use the claims with no general bearing. Therefore, a company must remember that what is posted on its website will fall under The Marketing Act (SFS 2008:486), and hence, all the claims an e-retailer makes to promote sustainability will fall under the act. §10 in The Marketing Act as well as Welander state that a company must not make use of misleading representations or false statements regarding someone else's or the company's business activities. Hence, a company needs to verify the claim and have the necessary evidence to substantiate the environmental claims upon request. If the e-retailer cannot do so, the claim is considered misleading and thus, violates §10 of The Marketing Act, which is what 83% of the participating companies have done.

Both Welander and The Swedish Consumer Agency (2023), mean that a claim can also be misleading if it is assessed to be misunderstood by the average customer, even though the information about the claim is correct. The average customer cannot be expected to know the significance of different sustainability terms that, for example, an e-retailer uses or what environmental benefits are intended when the claims are being made. Therefore, e-retailers must clarify the claim in immediate proximity to the claim in question; however, none of the participating companies has provided any immediate clarification of the claims they make. On a broader scale, the mapping showed that there were only 8% (i.e., two e-retailers) of the 25 e-retailers using sustainability terms that had any clarification of the sustainability term in direct connection to the claim.

General environmental claims, such as *"Environmentally friendly"*, are considered imprecise and unclear for the common customer and thus, should only be used if a thorough investigation of the claim has been made (Konsumentverket, 2023). However, the mapping showed that 44% of the e-retailers that decided to use sustainability terms used *"Environmentally friendly"* to describe LSPs' allegedly sustainable last-mile delivery. It can only be assumed that the e-retailers that use the term *"Environmentally friendly"* do not, or only a very few, carry out a thorough investigation of the claim.

To create rigor in e-retailers' check-outs, make it easier for the customer to make an informed decision about the delivery option, and not have ambiguous as well as imprecise sustainability terms, an industry agreement regarding fossil-free delivery was created. However, as Aster (1) (2022) and Welander point out, e-retailers still need to continuously validate that the LSPs meet the requirements for fossil-free last-mile delivery as well as provide information to the customer about the definition of fossil-free delivery. Two of the participating companies have signed the industry agreement, but neither one of them controls whether the LSPs meet the requirements for fossil-free delivery. Out of the interviewed companies, Alpha stood out in this regard, as they had set company guidelines not to use any sustainability terms for the last-mile delivery options at the check-out, because they knew they could not confirm these claims. As Welander emphasizes, the e-retailer can be convicted in court since the e-retailer has a contributory liability for the claims made by the LSP. Therefore, the following proposition is presented:

*Proposition (i): E-retailers **must validate** the environmental claim and provide sufficient information in immediate proximity to the claim that has been made to not violate Swedish law, which states that all claims must be verified, something that e-retailers to a large extent does not do today, risking legal issues and confusion among customers.*

## 5.2 E-retailers' Views on Sustainability

The general view on sustainability varied between the interviewed companies. Most of them claimed it was very important for the company when directly asked, but the actual sustainability focus appeared to not always correlate. One instance in which it became evident how the interviewed companies' views on sustainability differed was when they were asked to define what a sustainable last-mile delivery was to them, see Table 4.8. As discussed in Chapter 2.1, according to Glavič and Lukman (2007), there is a general ambiguity in the definition of the concept, which is also clear in the companies' definitions. The answers compared to the chosen definition in this thesis indicate the priorities and focus areas of the companies. The definition of environmentally sustainably last-mile deliveries that was presented in Chapter 2.2, which was based on definitions from Lim, Jin and Srai (2018), Gevaers, Van de Voorde and Vanelslander (2014), Harrington et al. (2016), and Fulton, Clarke and Albán (2017), was as follows: *"the last segment of B2C delivery, which takes place from the last transit point to a final consignee's preferred collection point and avoids, to the maximum practicable extent, the irreversible and irretrievable commitment of resources"*. Some e-retailers' definitions were more focused on the fill rate of parcels and vehicles, whereas some were more focused on the bigger picture, how last-mile deliveries can contribute to a more sustainable society in all three dimensions. Epsilon, for example, only mentioned that the focus should be on the fill rate in an environmentally sustainable delivery, not mentioning the use of resources or the resulting environmental impact.

Another instance where this difference between the claimed focus on sustainability and actual work appeared was with which LSPs the e-retailers offered last-mile deliveries. As presented in Table 4.4, the degree of environmental sustainability varied between the different LSPs.

Instabox, Budbee, and Airmee claimed to be *"100% Fossil-free"*, the rest of the LSPs had different sustainability goals and were at different stages of progress toward meeting those goals. The reason behind the variation is partly the size and organizational structure of the LSPs, where some are tech-focused and funded start-ups, e.g., Budbee and Instabox, and others are older, more established businesses with many types of services and larger, older vehicle fleets, e.g., Postnord and Schenker. Meaning that e-retailers are making an active decision on which LSPs they work with and have the possibility to prioritize the ones leading the transition towards more environmentally sustainable last-mile deliveries.

The only e-retailer that prioritized environmental sustainability in the choice of last-mile delivery options offered was Gamma, which only offered fossil-free deliveries. Several of the other interviewed companies claimed that sustainability was very important and highly valued for them, but it appeared not to be the highest priority when choosing LSPs. Epsilon, for example, said that they were *"very keen on sustainability and environmental work"*, but later explained that sustainability was not a deciding factor in which delivery options to offer. For them, cost and customer value were more important, which resulted in them offering air delivery in some markets. The low priority of sustainability was evident when the companies were asked to rank which factors influenced which delivery option was placed at the top in the check-out, see Figure 4.2. There, sustainability ended up being behind both cost for the company and perceived quality and lead time. The following proposition is presented:

*Proposition (ii): Given the sustainability claims in e-retailers' policies, sustainability should be a* ***higher priority*** *in the decision to offer last-mile delivery options, but they still tend to prioritize cost and speed in last-mile delivery options.*

## 5.3 The Environmental Sustainability of E-retailers' Delivery Options

As discussed in Chapter 2.4, the different last-mile delivery options have different environmental impacts, and a factor such as traveled kilometers per parcel may vary between, e.g., service point delivery and home delivery. The environmental impact of the delivery is not only the amount of GHG emissions per parcel but also the impact in terms of non-exhaust air pollutants, noise, congestion, biodiversity loss, and resource use (European Environment Agency, 2022). When e-retailers consider the environmental impact of a delivery option, it therefore, becomes one-dimensional to only take the number of emissions into account.

However, the resulting environmental impact is still mainly dependent on the type of vehicle and fuel that are used in the delivery (Velazquez & Charkov, 2019). Among the LSPs, there is a generally high focus on being fossil-free, with many of them using only HVO100 (i.e., biodiesel). While biofuels have a much lower environmental impact than fossil fuels, it is important to keep in mind that fossil-free does not equal emission-free or impact-free, as mentioned by the European Environment Agency (2022). Electric vehicles, compared to combustion vehicles, run on biodiesel and do not have the emissions generated from land use

changes, for example. However, their environmental impact also depends on how the electricity is produced. That being said, the environmental impact of the last-mile delivery options the e-retailers choose to offer may therefore vary for the same delivery type provided by different LSPs. Which option is the best from an environmental sustainability point of view may also vary depending on the circumstances of the delivery; one option might have a lower environmental impact in a city but be inefficient in the countryside (Song et al., 2009). A typical example of this is home delivery, where a van in a city can deliver many parcels with few traveled kilometers but very few parcels with many traveled kilometers in the countryside. Considering this, a conclusion could be drawn that there is not one delivery method that is universally better than the others. To offer as many sustainable last-mile delivery options as possible, it would therefore seem like the options need to be adapted to the geographic region and similar circumstances of every individual order.

As mentioned, the LSPs have varying degrees of being fossil-free, whereas Instabox, Budbee, and Airmee claim to be *"100 % Fossil-free"*, and, e.g., Postnord is fossil-free in some regions. Out of the interviewed companies, most offered all last-mile delivery methods from each LSP that were available for the customer's postal code. Gamma was the only company that customized the available LSPs according to which regions they were fossil-free in, to ensure that Gamma's last-mile deliveries were always fossil-free. If more e-retailers did the same, it would put more pressure on the rest of the LSPs to accelerate their transition to being fossil-free to not lose market shares. Therefore, the following proposition is presented:

*Proposition (iii): For e-retailers to put pressure on LSPs to offer environmentally sustainable last-mile delivery options, the options should be presented to the customer depending on which has the least environmental impact for that specific postal code, as LSPs may be, e.g., fossil-free in some regions and others not.*

## 5.4 E-retailers' Decisions on Sustainable Last-Mile Delivery Options

The five factors influencing the decision on sustainable last-mile delivery options presented in the conceptual framework will be discussed below, where the interviewed companies' answers will be analyzed and compared to the theory presented in Chapter 2.

### 5.4.1 Lack of Knowledge

The variation in definitions of the sustainability terms suggests there is a lack of knowledge of sustainability among Swedish e-retailers, which is in line with Sallnäs et al. (2022). This further leads to the question of how e-retailers can claim they work with sustainability or provide sustainable deliveries when they do not know the meaning of those claims. Several of the companies interviewed trusted the information provided by the LSPs regarding the environmental impact of last-mile deliveries and used it to promote that alternative to check-out. The ambiguity of these terms could result in information failure, where the two parties agree on something but are not talking about the same thing and thus, confuse or mislead the

customer (Erdem, Swait & Valenzuela, 2006). The company that had the most definitions of the four terms that were similar to the ones used in this thesis was Beta, where three out of four definitions were similar. Alpha, Zeta, and Epsilon had one definition each that was similar to the ones in the thesis. Out of these, Beta, Epsilon, and Zeta assessed the level of general sustainability knowledge among employees to be high, whereas Alpha assessed it to be mixed. Gamma also assessed it as mixed, and Delta as low. Both Gamma and Delta had no definitions that were similar to the ones in the thesis. Whether there is a correlation between the companies' assessed sustainability knowledge level and similarity in definitions seems to vary between the companies. However, it should be noted that the actual level of sustainability knowledge might be different from what was communicated in the interview.

The reason for a possible information failure from e-retailer to customer may be due to the insufficient information LSPs provide to each e-retailer during negotiation. Out of the six interviewed companies, only one tried to get hold of more information regarding LSPs' sustainability work and what the information provided means. However, at some companies, different people are responsible for the contracts of the LSPs and the chosen sustainability terms in the check-out, which means that even if sufficient information was to be provided on the LSPs' sustainability work, there is a risk of miscommunication. Following, if the person who is responsible for the contract does not have the same definition of the common sustainability terms as the LSP, then confusion easily arises among e-retailers due to the lack of knowledge within the sustainability area. Hence, e-retailers do not have sufficient knowledge to convey the environmental impact of the different last-mile delivery options they offer to their customers (Sallnäs et al., 2022). This is where the industry agreement could help both parties, as there are clear instructions and requirements the parties need to fulfill, which means they would become less dependent on each other's knowledge level and the quality of the communication. Therefore, the following proposition is presented:

*Proposition (iv): If an e-retailer offers environmentally sustainable last-mile deliveries, then…*

a) *e-retailers should sign the industry agreement to decrease the risk of miscommunication, allowing customers to better understand the environmental impact of the delivery options.*
b) *Aster should offer support within the sustainability area to educate e-retailers on the subject and thus, increase knowledge, leading to more informed decisions for e-retailers.*

In Figure 5.1, a summary of the underlying reasons for the lack of knowledge within the sustainability area and what propositions are proposed for improvement is shown.

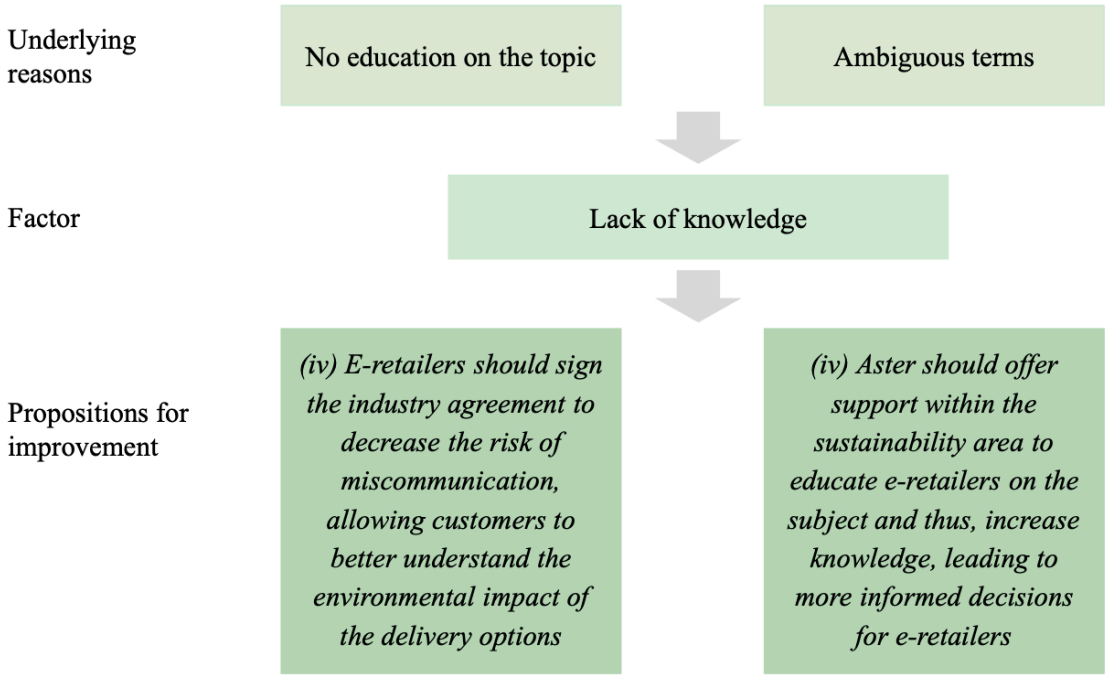


***Figure 5.1:*** *Summary of the underlying reasons that lead to a lack of knowledge and what propositions are proposed.*

### 5.4.2 Terminology

An interesting finding regarding the usage of sustainability terms for the last-mile delivery options was by whom they were mostly used, see Table 4.1. The mapping of the 100 biggest e-retailers in Sweden showed that 100% of the companies in the beauty sector used sustainability terms, while only 6.2% of the companies in the home and house sector did. The numbers for the fashion and other sectors, 38.8% and 30.0%, respectively, were closer to the industry average of 34.7%. The reasons behind the differences could be the type of customer, the type of product, and/or other factors. It suggests that it is very important, or even necessary, for companies in the beauty sector to offer sustainable delivery options, something that is further reflected in Gamma being the one out of the interviewed companies that prioritized sustainability the most when choosing delivery options. However, it should also be noted that only 8% of the companies that used sustainability terms had a clarification of the meaning of the term, which indicates the gap between claiming to be environmentally sustainable and ensuring that is the case.

The four terms the respondents were asked to define have all appeared at the check-outs of Swedish e-retailers. As discussed in 2.1, they all have varying degrees of ambiguity, which was also made clear by the broad scope of definitions from the interviewees. Which terms were defined similarly to the definition in the thesis and by which companies can be seen in Table 5.1. As shown by the survey by Nordic Swan Ecolabel and the Swedish Retail Institute, discussed in Chapter 1, Introduction, 52% of the respondents did not know what was meant by an environmentally friendly delivery option. This, in combination with the Cambridge

Dictionary (2023) and the respondents' definition of, e.g., "*Environmentally friendly"* clearly shows how ambiguous the term is. The respondent from Alpha even declined to define it and called it *"a hopeless word"*. Still, it was the second most frequently used term to describe the sustainability of a delivery option among e-retailers. The term *"Climate-smart"* was defined differently by each interviewee, and none of the definitions was the same as the one set by The Swedish Academy Dictionary (2015). The respondent from Alpha declined to define this term too, claiming it was too *"fuzzy"* and *"stupid to use"*.

***Table 5.1****. The definitions from respondents that were similar to the ones in the thesis. A green box indicates the definition was similar.*

| Definition | This thesis' definition | Alpha | Beta | Gamma | Delta | Epsilon | Zeta |
|---|---|---|---|---|---|---|---|
| **Fossil-free** | The energy used does not originate from fossil fuels (Sveriges Allmännytta, 2023). | | | | | | |
| **Environmentally friendly** | It is not harmful to the environment (Cambridge Dictionary, 2023). | | | | | | |
| **Carbon offsetting** | The reduction of emissions made in order to compensate with the same amount elsewhere (Naturskyddsföreningen, 2023). | | | | | | |
| **Climate-smart** | Strive to counteract the deterioration of the climate (Svenska Akademiens ordlista, 2015). | | | | | | |

The more quantifiable the terms were, the more the interviewees' definitions were similar to the definitions used in this thesis. It was the term *"Fossil-free"* that had the most similar definitions from the interviewees as the one by Public Housing Sweden (2023), as half of the interviewees defined it similarly. Out of the four terms, this is the most quantifiable one, the one that is the most possible to measure. As discussed in Section 2.5.2, it is the term that is most focused on in the industry agreement (Aster (2), 2022), and according to Figure 4.1, it is the sustainability term that is most frequently used for last-mile deliveries in the check-out. Therefore, the following proposition is presented:

*Proposition (v): Given the lack of standardized terminology today, e-retailers should start by using sustainability terms that are as quantifiable as possible, e.g., fossil-free, to decrease confusion and improve communication for all actors.*

In Figure 5.2, a summary of the underlying reasons for the use of different sustainability terminology in the check-out and what proposition is proposed for improvement is shown.

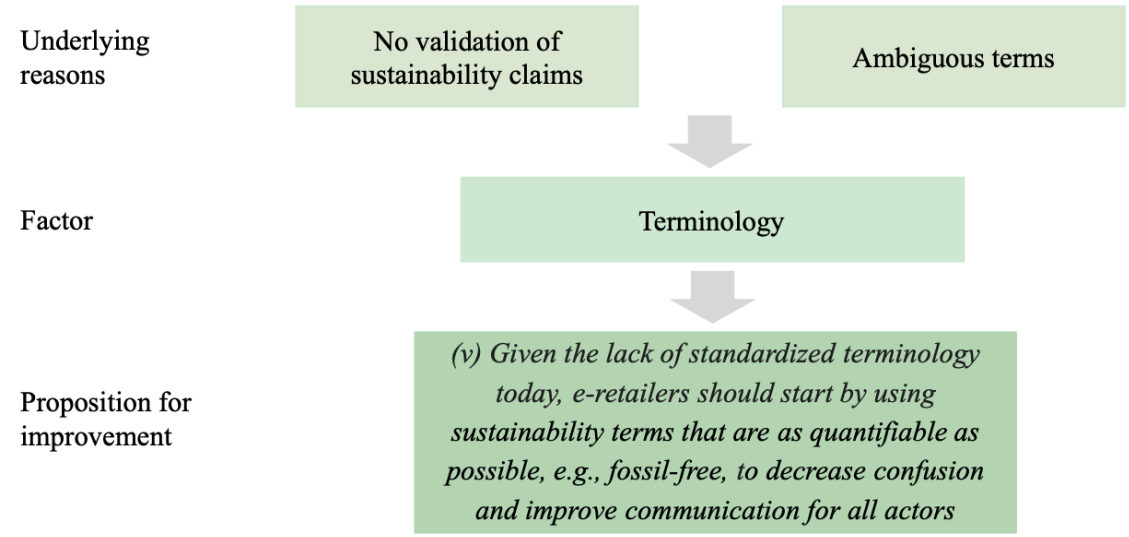


***Figure 5.2:*** *Summary of the underlying reasons for the use of different terminology and what proposition is proposed.*

### 5.4.3 No Comparable Measurement for CO2

As of today, LSPs are already making calculations for their $CO_2$ emission, but the calculations are done by obtaining real-time measurements or estimations that are based on different models and emissions factors, which indicates that LSPs can calculate $CO_2$ emissions in various ways (Pandey, Agrawal & Pandey, 2011). The lack of a standardized way to do these calculations results in the conditions for different LSPs differing, which makes it difficult for both customers and e-retailers to compare (Dubisz, Golinska-Dawson & Zawodny, 2022). As a result, one LSP can claim to be fossil-free or to have reduced their $CO_2$ emissions per package, which can put them in a favorable position both in a negotiation with an e-retailer as well as in marketing to customers. However, another LSP that measures their emissions based on different emission factors or measurements can still report the same $CO_2$ per package, making the methodology neither comparable nor fair (Trafikanalys (1), 2022; Alpha, 2023; Epsilon, 2023).

It should be possible for e-retailers to provide more information regarding the $CO_2$ emissions per package, but technical obstacles, such as accessibility to reliable and comprehensive data, make it difficult for the industry to agree on a comparable measurement method (Dubisz, Golinska-Dawson & Zawodny, 2022). However, the information that LSPs provide to e-

retailers today creates a challenge associated with having to communicate the $CO_2$ emissions and what the significant reduction in emissions is based on. Making it easier for the LSPs to communicate the sustainability terms, but it highlights the uncertainty of whether the claims are correct or not. Therefore, the following proposition is proposed:

*Proposition (vi): To have a more transparent and standardized way to compare emissions, there should be a collective effort among e-retailers to establish a comparable measurement for $CO_2$ that has the same input variables and is calculated similarly throughout the industry.*

In Figure 5.3, a summary of the underlying reason for no comparable measurement for $CO_2$ and what proposition is proposed for improvement is shown.

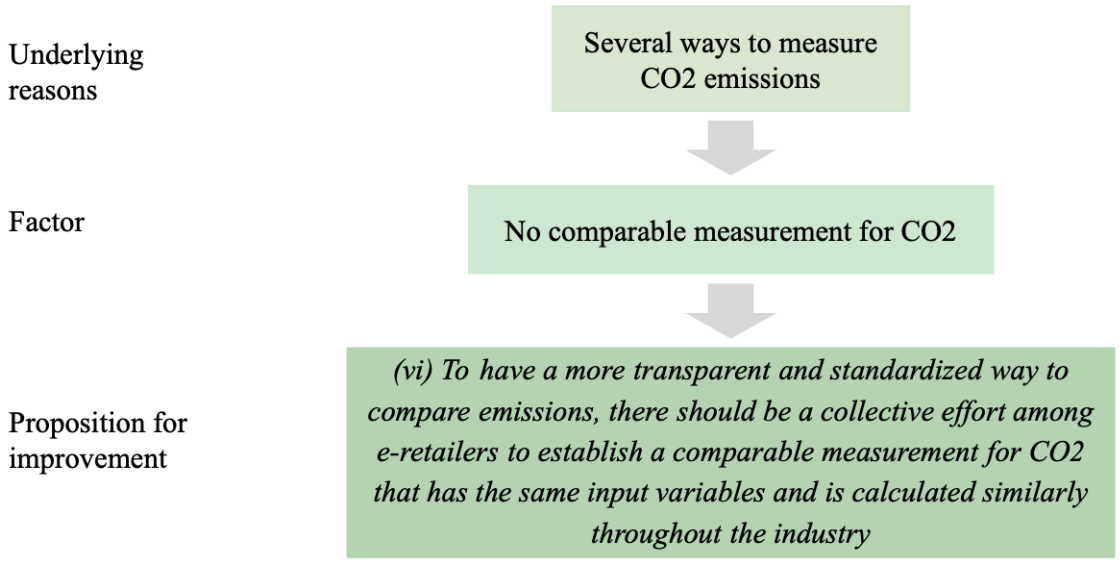


***Figure 5.3:*** *Summary of the underlying reason for no comparable measurement for $CO_2$ and what proposition is proposed.*

### 5.4.4 Fear of Greenwashing

As discussed, the lack of knowledge can be attributed to the fact that there is no comparable measurement for $CO_2$ emission, the terminology is not being used systematically, and there is uncertainty about what the terms mean (Dubisz, Golinska-Dawson & Zawodny, 2022; Sallnäs et al., 2022; Trafikanalys (1), 2022). This results in difficulty for e-retailers in understanding the LSPs' sustainability terms. Thus, the lack of uniformity and standardization in the check-outs increases the risk of greenwashing if the LSPs do not live up to their sustainability claims (Sallnäs et al., 2022).

All of the participating e-retailers have highlighted the importance of sustainability and emphasized how much each company works with it. However, when it comes to carbon offsetting, there has been a difference of opinion on whether it is seen as something positive or negative for a company to do. A company that uses carbon offsetting allows emissions to continue, but it does not reduce the impact of climate change. As the respondent from Zeta pointed out *"Carbon offsetting should only be done for a short period; otherwise, it can be*

*seen as greenwashing"*. From the mapping, it could be seen that 27.7% of the largest e-retailers in Sweden use carbon offsetting to compensate for their negative impact, but only one company highlights it in the check-out.

It has been mentioned by four of the respondents that sustainability has to be prioritized by the management and be a strategic part of the company for an e-retailer to perceive sustainability as an important factor in offering sustainable last-mile deliveries to customers. Hence, according to the respondents, sustainability must be a priority for the company to be able to offer sustainable last-mile deliveries as well as work with sustainability issues. It is claimed by two interviewed respondents that an e-retailer has to be of a larger scale to have the bandwidth to be able to work with sustainability issues; otherwise, they have to trust that the LSP does what they say. However, the companies that have been interviewed are some of the largest e-retailers in Sweden and thus, should have sufficient bandwidth and be of a larger scale to be able to work with sustainability issues and verify the reporting of the environmental impact from LSPs. The verification can be done by them or a third-party to prevent greenwashing and violations of The Marketing Act. Therefore, the following proposition is presented:

*Proposition (vii): To avoid claims of greenwashing, e-retailers should have a third-party verify the reporting of LSPs' environmental impact and set regulations that hinder ambiguous and inconsistent use of sustainability terms.*

In Figure 5.4, a summary of the underlying reasons for fear of greenwashing and what proposition is proposed for improvement is shown.


***Figure 5.4:*** *Summary of the underlying reasons for fear of greenwashing and what proposition is proposed.*

### 5.4.5 Competitive Aspect

An important aspect for e-retailers to consider is the competitive aspect, which is when customers will choose the preselected delivery option (i.e., the option at the top of the check-out) (Ingrid, 2023). Both Sallnäs et al. (2023), as well as all the respondents, confirm that the selected option will be chosen to a greater extent than other delivery alternatives. As a consequence, when LSPs are placed in a certain order, the likelihood of an LSP getting the largest number of orders will increase if they are placed at the top. It has been concluded that the interviewed companies prioritize the delivery option that is most inexpensive when determining which LSP is placed at the top of the check-out. Lead time and perceived quality are almost as important as cost, whereas sustainability and strategic alliances are the least prioritized aspects at the check-out. Those delivery options will therefore, most likely be at the bottom of the check-out list, even though Ignat & Chankov (2020), and the survey from Gamma prove that customers are keener to choose a sustainable delivery option before any other delivery alternative. However, Gamma's statistics disproved the survey, as it showed that the customers would rather choose a free delivery alternative. As a result, many e-retailers tend to prioritize profitability and lead time over sustainability. However, Ignat and Chankov (2020), explained that if no or limited information regarding the environmental footprint of the delivery options is provided, customers will ignore any dimensions of the environmental impact of the last-mile deliveries and will probably choose the most economical delivery. The lack of information is a missing effort in sustainability branding for e-retailers to promote correct information to their customers (Kumar & Christodoulopoulou, 2014; Miller & Merrilees, 2013; Erdem, Swait & Valenzuela, 2006; Narula & Desore, 2016). As the mapping showed, only two e-retailers and none of the interviewed companies had any clarification or information regarding the sustainability claims. The lack of information combined with the fact that customers will, to a greater extent, choose the top option could be the reason why the respondents think that sustainability does not drive sales.

If Sweden is to achieve their long-term goal to prevent climate change and have no net emissions of greenhouse gases into the atmosphere by the year 2045 (Regeringskansliet, 2017), then e-retailers need to put pressure on the transport sector. Hence, sustainable delivery options have to be chosen to a greater extent by the customer, and these options need to be set as a default option or at least be placed at the top. Therefore, the following proposition is presented:

*Proposition (viii): As customers tend to choose the top option, sustainable last-mile delivery options should be placed at the top of the check-out to put pressure on the transport industry for a quicker transition towards sustainable transport.*

In Figure 5.5, a summary of the underlying reason for the competitive aspect and what proposition is proposed for improvement is shown.

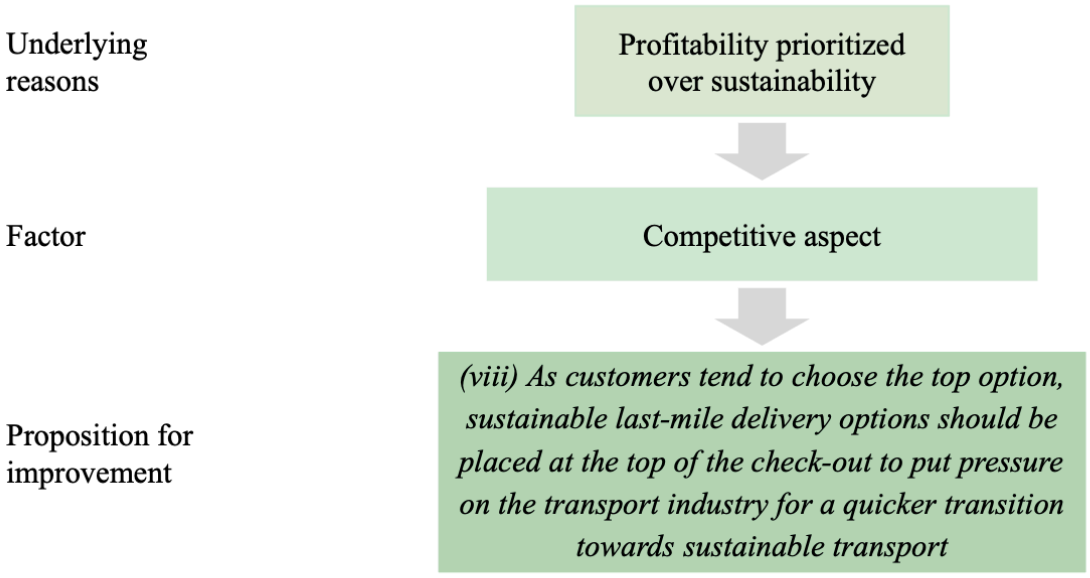


***Figure 5.5:*** *Summary of the underlying reason for the competitive aspect and what proposition is proposed.*

## 5.5 Contextualizing the Propositions

Each heading has been discussed and analyzed, which has provided significant underlying reasons for the mentioned factors that affect e-retailers' decisions on offering and communicating environmentally sustainable last-mile delivery options. The presented propositions will be further discussed below, as they will be placed in the conceptual framework and categorized according to the main theme. This will tie the propositions together and put them in a wider context to gain a holistic understanding.

The conceptual framework presented in Chapter 2.6 has been updated with the underlying reasons for the factors they affect and the corresponding propositions, which can be seen in Figure 5.6 below. By doing this, the findings from the literature review in Chapter 2 are connected with the findings from the data analysis in this chapter. The five figures (Figures 5.1-5.5) that illustrate the underlying reason(s) and the corresponding factor and proposition, which were presented previously in this chapter, are combined and placed in the updated conceptual framework. This gives a better overview and understanding of the connections between everything. As several underlying reasons affect multiple factors, they are connected in the figure, as are the underlying reasons with each other since one will affect or depend on the others. This also results in them indirectly affecting each other's related factors. To exemplify, since the terms are used without any education on the topic, it results in many different definitions and increased ambiguity, which in turn makes the terms difficult to validate and calculate $CO_2$ emissions, which leads to even less knowledge in the company, and management deprioritizing sustainability.

The propositions for the three broader topics of *Marketing Regulations, E-retailers' views on Sustainability,* and *The Environmental Sustainability of E-retailers' Delivery Options*

(Chapters 5.1-5.3) are also included in the updated conceptual framework. The proposition for *Marketing Regulations* (proposition (i)) is placed with proposition (v) under the factor "*Terminology".* The other two propositions, (ii) and (iii), are placed under *Last-Mile Delivery Options* and *Environmental Sustainability in Last-Mile Deliveries,* respectively. This placement was based on what the three propositions mainly addressed, and their placement in the conceptual framework illustrates that the propositions regard all levels of the framework.

The framework illustrates the holistic picture with propositions for how e-retailers can overcome the current challenges connected with offering and communicating environmentally sustainable last-mile deliveries. For e-retailers to achieve this, they need to start at the top of the framework by prioritizing sustainability, and then make sure they present the delivery options to the customers depending on which option has the least environmental impact for a specific postal code. After this, they should move on to addressing the specific factors and challenges and overcome them by implementing the propositions. When all this is achieved, they can finally reach the step of offering environmentally sustainable last-mile deliveries accurately.

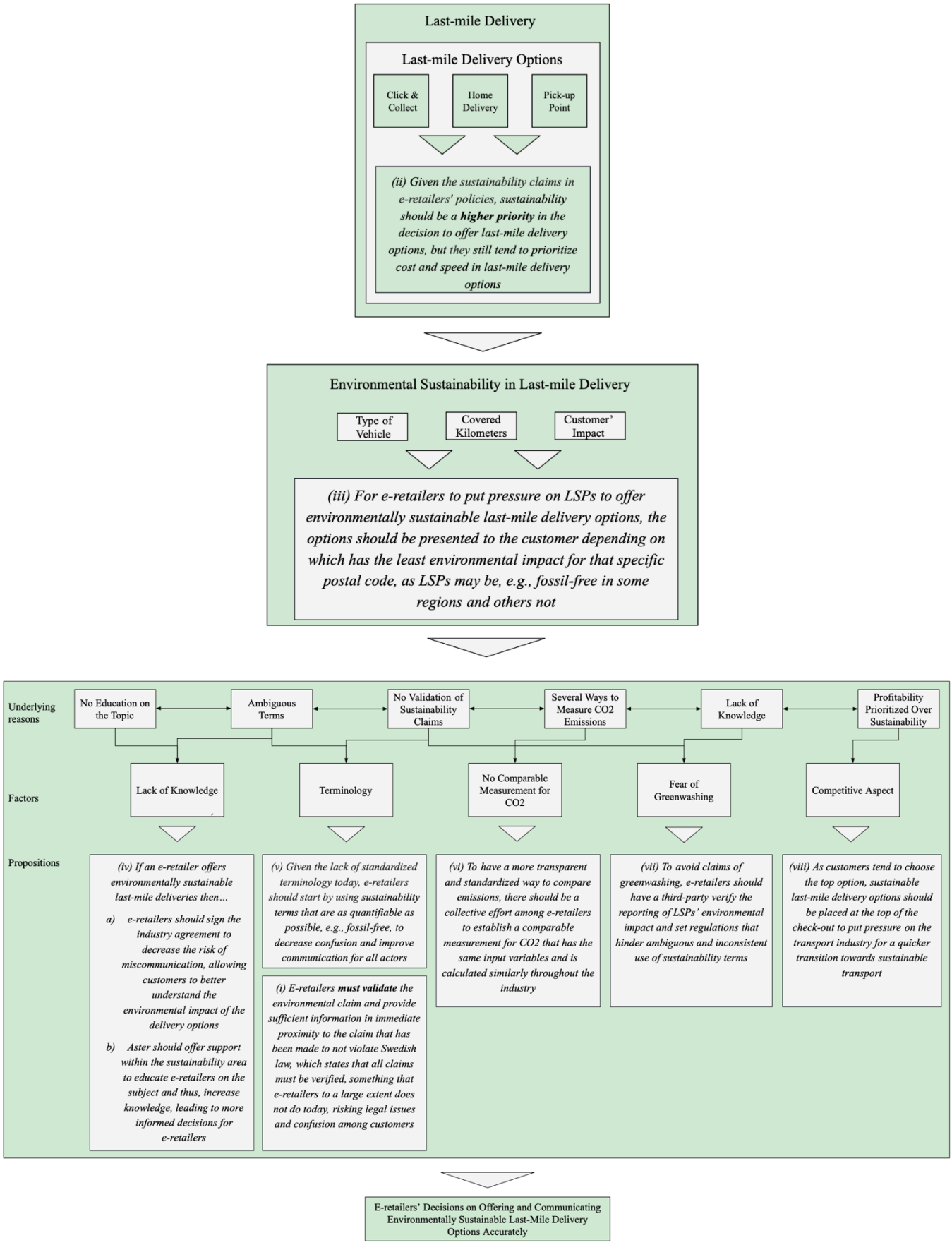


***Figure 5.6:*** *An updated conceptual framework with findings from the analysis.*

As seen in the updated conceptual framework, many of the underlying reasons and factors are interrelated, and the propositions have similarities. As seen in Figure 5.6, propositions (i), (v), and (vii) have the same underlying reason (i.e., *No Validation of Sustainability Terms*) and impact each other. To decrease confusion and improve communication, e-retailers need to use quantifiable sustainability terms that are validated and provide sufficient information regarding the term to avoid claims of greenwashing. This reasoning resulted in many propositions addressing similar themes. The common themes were identified, and the propositions were grouped accordingly, see Figure 5.7. The grouping resulted in three categories: *Company Priorities, Validation,* and *Industry Collaboration.*

The first category, *Company Priorities*, regarded the propositions that were focused on what could be done within the company. The second category, *Validation,* was based on which propositions were directly related to the use of terms, which addressed the current lack of standardization and low degree of validation. The third category, *Industry Collaboration,* was based on how e-retailers can work together towards achieving change within the industry. Each category is further explained below.

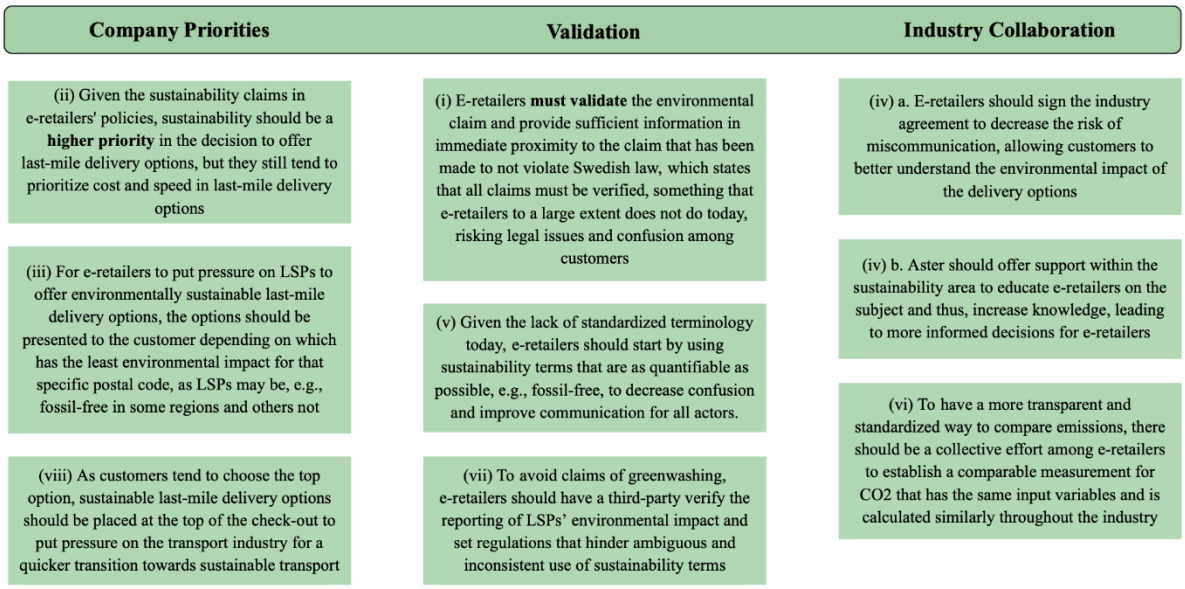


***Figure 5.7:*** *The three different categories the propositions have been divided into.*

The first category is *Company Priorities,* and the propositions from the headings *E-retailers' Views on Sustainability, The Environmental Sustainability of E-retailers' Delivery Options*, and *Competitive Aspect* were grouped in the category. If sustainability was prioritized within the company, then e-retailers would, to a greater extent, follow their sustainability policies, which would place environmentally sustainable last-mile delivery options at the top of the check-out. Since the preselected and/or top option is chosen more frequently by customers than any other delivery alternatives, the LSPs that offer sustainable last-mile deliveries to customers' specific postal codes would get the most orders. Thus, by prioritizing sustainability and making it a strategic part of the company, intensive pressure would be put on the transport and delivery sector to become more sustainable.

The second category is *Validation,* and the category includes propositions from the headings *Marketing Regulations, Terminology,* and *Fear of Greenwashing*. Sustainability claims were widely used and, in many cases, without any bearing, which is why e-retailers need to validate the used sustainability claims to not confuse customers and risk legal issues. The validation should be made by a third-party that hinders inconsistent use of sustainability terms that are not quantifiable. Hence, this would make it easier for e-retailers to provide sufficient information regarding the claim and avoid claims of greenwashing. Whereas customers can assess the climate impact of the various delivery options.

Lastly, the third category is *Industry Collaboration*, which includes the propositions from the headings *Lack of Knowledge* and *No Comparable Measurement for* $CO_2$. These propositions regarded the industry agreement Aster and the measuring method for $CO_2$ emissions. Both of these concepts will only have the desired impact if numerous e-retailers work together. A standardized way of measuring $CO_2$ emissions will not be of any use if it is not applied by many e-retailers. The industry agreement is the first step towards a wider industry collaboration and perhaps a platform that, in the future, can be developed to cover more areas. By working together, the e-retailers can also put more pressure on LSPs to accelerate their sustainability transformation.

# 6. Discussion

*This chapter will discuss the implications of the study. Factors that base e-retailers' decisions on offering and communicating environmentally sustainable delivery options will be outlined, and the chapter will also highlight the importance of having uniformity among the sustainability terms used and validating those terms.*

From the analysis, several relevant aspects were identified that impact e-retailers' decisions on last-mile delivery options. Specifically, the thesis has outlined why and how e-retailers offer environmentally sustainable last-mile deliveries, and there are various challenges linked to sustainability aspects in the last-mile distribution industry. One challenge can be linked to delivery inefficiency due to the low margins that occur when LSPs subsidize deliveries and waive the minimum order size to compete. The subsidized deliveries cause inefficient use of resources and an increase in both traffic jams and GHG emissions as the number of transport vehicles on the roads increases to decrease the lead time (Luigi Ranieri et al., 2018; Iwan, Kijewska & Lemke, 2016). For Sweden to become a fossil-free welfare country, where future generations will not have to deal with today's environmental problems (Regeringskansliet, 2018), there needs to be a transition within the transport and delivery sector, and thus, the sector has to become more sustainable. For e-retailers to help put pressure on the sector, it is not sustainable for them to use carbon offsetting as an excuse to compensate for their carbon footprint instead of prioritizing the reduction of in-house emissions. Since 20 of the 72 companies use carbon offsetting and only 1 of these companies emphasizes it in the check-out, it may point out that carbon offsetting is not seen as something positive for the customers and/or as a form of greenwashing. Hence, this may be the reason why 19 companies choose not to promote *"Carbon offsetting"* at the check-out.

Another challenge is the information failure that arises in the communication between LSP and e-retailer, and between e-retailer and customer at the check-out. Sustainability branding can decrease the risk of misinformation or information failure between different parties, and by incorporating sustainability into companies' branding and giving customers information about it, can ease customers' decision-making and help them identify sustainable companies (Kumar & Christodoulopoulou, 2014; Miller & Merrilees, 2013). As Chandler and Werther (2020) mentioned, brands that drive different sustainability initiatives are presented as being more trusted and thus, performing better when adapting to the environment they are operating in.
Today, e-retailers offer no or limited information about the consequences of each delivery choice as well as what the chosen terminology means (Buldeo Rai, Verlinde & Macharis (1), 2018; Young et al., 2010; Lurell et al., 2018; Ignat & Chankov, 2020). Customers are more likely to consider environmental deliveries if information about which LSP offers sustainable last-mile deliveries is provided. In particular, it has been shown that customers are willing to pay more, choose a less convenient delivery location, or wait longer in exchange for an environmentally beneficial last-mile delivery (Ignat & Chankov, 2020; Buldeo Rai et al., 2021). This is also confirmed by Gamma's survey regarding what their customers prioritized when choosing an LSP for the check-out. Their customers wanted sustainable delivery options and would rather choose that over any other delivery alternative.

Research has also shown that delivery alternatives at the top of the check-out will be more likely to be chosen than other delivery options and thus, the LSPs that are placed at the top of the check-out will, to a greater extent, get the most orders (Ingrid, 2023; Sallnäs et al., 2022). This suggests that sustainable delivery options would be more likely to be chosen by the customer if there was more information about them and if they were placed at the top of the list of delivery options. However, this was not the case among the interviewed companies, as most of them did not provide any information about the environmental impact of their last-mile delivery options and did not place the sustainable options at the top, even though they all claimed to value sustainability highly in their operations. It was established from the interviews that the participating companies prioritize LSPs that are the most profitable for the company and are placing them at the top of the check-out. Sustainable delivery options are more likely to be placed further down or at the bottom of the check-out list since sustainability is one of the least prioritized factors among the participating companies. Hence, if the top last-mile delivery option is most likely to be chosen and this is not a sustainable option, then this could be a reason why e-retailers think sustainability does not drive sales. This results in a reduced commitment for companies to both invest in sustainability and put pressure on the transport and delivery industry. Hence, a potential reason why some companies say it is difficult or impossible to prioritize, e.g., the validation of the LSPs' environmental claims, is that the management does not see any correlations between profitability and sustainability.

The economical aspect is also confirmed by Ignat & Chankov (2020), who state that customers will choose the most economical delivery option and ignore any dimensions of sustainability if no or limited information about the environmental impact of the last-mile delivery is provided. This was supported by Gamma's statistics, which showed that contrary to their survey, their customers would rather choose a free delivery option than a sustainable one. Providing information regarding the environmental impact can act as an incentive for customers in their decision-making process when choosing delivery alternatives (Buldeo Rai et al., 2021), which may be the reason why many of the e-retailers choose to use different sustainability terminology at the check-out. That being said, using no sustainability terms at all to distinguish more and less environmentally sustainable delivery options as they are not confirmed, like Alpha is doing, might not be the best solution either. As mentioned, Ignat and Chankov (2020) found that customers are willing to pay more, choose a less convenient delivery location, or wait longer in exchange for an environmentally-beneficial last-mile delivery. By failing to communicate this, customers will probably choose the most economical alternative. It could result in customers choosing less sustainable delivery options since they have no information or way of comparing the available options in terms of sustainability, even if they want to, thereby involuntarily contributing to a larger environmental impact. Therefore, as a way to overcome this, the industry agreement was created.

The industry agreement was created to have a uniform check-out among the e-retailers (Aster (1), 2022). However, the agreement seems to give the e-retailers the impression that the environmental claims made by the LSPs are automatically legitimized and validated. Thus, many e-retailers do not confirm the claims or provide any information regarding what, for instance, fossil-free delivery means and expect the common customer to understand it. As

Welander emphasizes, there is a risk for e-retailers to be convicted in court since they have a contributory liability for the claims made by the LSP. Thus, the claims must be validated; otherwise, they are violating the law. A conviction of this kind would most likely result in the brand being denigrated, and the e-retailer would be accused of greenwashing. It can also mean that the e-retailers do not know how to validate the LSPs' environmental claims since they may not even know what the terms mean (Sallnäs et al., 2022). This results in some LSPs that can claim to be sustainable even if that is not the case. Furthermore, depending on what measurement method the LSPs are using, they can reduce their $CO_2$ emissions significantly (Dubisz, Golinska-Dawson & Zawodny, 2022; Trafikanalys (1), 2022). The drastic reduction is seen as an important factor for LSPs when negotiating with e-retailers as well as marketing to customers, as the LSPs want to perform better than their competitors. Hence, Alpha and Epsilon agreed that e-retailers cannot ensure that an LSP is, for instance, fossil-free. However, three out of the six companies interviewed trusted the LSPs without further checks. The respondent from Gamma highlighted that e-retailers need to be of a larger scale to have the bandwidth to be able to work with sustainability issues; otherwise, they have to trust the claims made by the LSPs. However, the participating companies are some of the largest e-retailers in Sweden and hence, are of a larger scale as well as having the bandwidth to work with sustainability issues. Four of the participating respondents mentioned that sustainability has to be prioritized by the management to be perceived as an important factor in offering sustainable last-mile deliveries to customers and working with sustainability issues. If management continues to deprioritize sustainability in their operations, it will prolong the urgently needed transition towards a sustainable future.

It should also be noted that the eight propositions vary in feasibility and impact. Some could be easier for e-retailers to implement, such as signing the industry agreement, placing the most sustainable delivery option at the top of the list in the check-out and adapting the available last-mile delivery options to the ones that are the most sustainable for the customer's postal code. The propositions to make sustainability a higher priority for e-retailers, and to standardize CO2 measurements across the industry are more comprehensive and only feasible from a long-term perspective, as they require larger organizational changes. This transition could possibly be accelerated by legislation on reporting standards or similar topics. The proposition regarding the urgent need for e-retailers to validate the sustainability terms they use might also seem feasible from a longer perspective, as it would require resources for a third party to handle it, or investments for themselves to do it. However, considering the possible consequence of being convicted of breaking the law, it should be prioritized as one of the most important propositions for e-retailer to implement.

# 7. Conclusion

*In this chapter, the conclusion of the thesis will be presented by summarizing key findings, answering the research questions, and addressing the thesis' research objectives. Also, practical and theoretical contributions, as well as the study's limitations, will be discussed. Furthermore, suggestions for future research in the area and reflections on the process are outlined.*

The purpose of this thesis was to investigate the phenomenon of why and how e-retailers offer sustainable last-mile delivery options. Last-mile deliveries are the least efficient part of the supply chain, and communication of the environmental impact of the deliveries often leads to confusion for both companies and customers. Firstly, to fulfill the aim, a definition of an environmentally sustainable last-mile delivery based on theory from existing literature was done. Secondly, a mapping was made of the 100 biggest Swedish e-commerce companies, which structured the delivery options of every company, as well as a mapping of potential sustainability terms used in the check-out by the e-retailers in Sweden. Lastly, six e-retailers were interviewed to gain an understanding of which factors are affecting and influencing e-retailers' decisions to offer and communicate environmentally sustainable last-mile delivery options and how these were presented to the customer at the check-out.

## 7.1 Addressing Research Objectives and Answering Research Questions

To fulfill the purpose of this thesis, the following research questions were formulated: "*How can environmentally sustainable last-mile deliveries be defined?", "Which sustainable last-mile delivery options are offered by e-retailers today, and which factors affect this decision?",* and *"What challenges and opportunities are there for e-retailers to offer and communicate environmentally sustainable last-mile deliveries?".* Each question is discussed and answered in the following sections.

### 7.1.1 Answering RQ1

The first research question was, *"How can environmentally sustainable last-mile deliveries be defined?".* This was answered by studying relevant literature on the subjects and then combining these into one definition. Both environmental sustainability and last-mile delivery are defined in several different ways in the literature. Most definitions of environmental sustainability come from the Brundtland definition of sustainable development, which is then specified in terms of the dimension of the environment and revised for accuracy and relevance. Definitions of last-mile delivery have varying system boundaries, meaning they include different scopes of the delivery, e.g., whether it is B2B or B2C, this is further developed in Section 2.2. The resulting definition was as follows: *"the last segment of B2C delivery, which takes place from the last transit point to a final consignee's preferred collection point and avoids, to the maximum practicable extent, the irreversible and irretrievable commitment of resources",* based on previous definitions by Lim, Jin and Srai (2018), Gevaers, Van de

Voorde and Vanelslander (2014), Harrington et al. (2016), and Fulton, Clarke and Albán (2017).

### 7.1.2 Answering RQ2

The second research question was, *"Which sustainable last-mile delivery options are offered by e-retailers today, and which factors affect this decision?"*. A mapping of the 100 biggest e-retailers in Sweden was conducted to answer this question. The mapping took LSP, type of delivery, sustainability terms, whether they do carbon offsetting, and which sector the e-retailer belongs to into account. Only e-retailers that had material package deliveries and the possibility to order as a private person were considered, which reduced the number to 72 e-retailers. There are three main types of last-mile delivery: home delivery, pick-up point, and click and collect. The environmental impact of these depends on factors like the type of vehicle, type of fuel, and geographical location of the customer's preferred delivery destination. Postnord, Instabox, and Budbee are the most used LSPs among Swedish e-retailers, see the full list in Table 4.4. Some LSPs claim to be *"100% Fossil-free"*, while others are partly fossil-free, see Section 4.4 for specific information for every LSP.

The mapping showed that out of the 72 e-retailers, 25 of them used sustainability terms for delivery options at the check-out. The use of sustainability terms also varied between the different sectors; all eight e-retailers in the beauty sector used sustainability terms, while only one out of 18 e-retailers in the home and house sector did. *"Fossil-free"* was the most commonly used term, followed by *"Environmentally friendly"*, *"Climate-smart"*, and lastly, *"Carbon offsetting"*. Two e-retailers provided information about the sustainability terms, one in the beauty sector and one in the sector other. 20 of the 72 e-retailers use carbon offsetting, but only one of these communicates it to customers at the check-out. The interviewed companies all offered different combinations of LSPs and delivery methods and had different reasons why. One interviewed company specifically only offered the customers fossil-free deliveries, which meant they adapted the available LSPs and delivery methods to the customers' postal code, regarding which LSPs could offer fossil-free deliveries to that address.

Chapter 2.5 identified five main factors that influence e-retailers' decisions to offer and communicate environmentally sustainable delivery options and thus, the factors became part of the conceptual framework. The five factors were:

- Lack of knowledge
- Terminology
- No comparable measurement for $CO_2$
- Fear of greenwashing
- Competitive aspect

The five factors were the basis for the interview guide, and the empirical findings gave an understanding of the underlying reasons for the emergence of the factors, see Chapter 5.4.

### 7.1.3 Answering RQ3

The third research question was, *"What challenges and opportunities are there for e-retailers to offer and communicate environmentally sustainable last-mile deliveries?"*. From the analysis, eight propositions were formed that regarded the challenges and opportunities that e-retailers face today considering environmentally sustainable last-mile deliveries.

The challenges and opportunities are summarized in the updated conceptual framework, which was first based on the theory from the literature review in Chapter 2, and then completed with the findings from the analysis in Chapter 5, see Figure 5.6. The identified underlying reasons and factors that affect e-retailers' decisions on environmentally sustainable last-mile deliveries are to a large degree codependent, as illustrated in the updated conceptual framework. Implementation of the propositions will enable e-retailers to offer and communicate environmentally sustainable last-mile deliveries accurately. The propositions were also grouped into three categories, see Figure 5.7, in which the main possibilities for improvements were identified.

The first category was *Company Priorities.* If sustainability was prioritized and a strategic part of the e-retailers' businesses, they would, to a greater extent, place environmentally sustainable last-mile delivery options at the top of the check-out, not the most cost- or time-efficient option. This would, on a larger scale, lead to e-retailers being able to put pressure on the transport and delivery sector to accelerate the transition to become more sustainable. The second category was *Validation.* In many cases, sustainability claims are used without any bearing, which is why e-retailers need to validate the claims. The validation should be made by a third-party, which would hinder the inconsistent use of sustainability terms that are not quantifiable. Hence, this would make it easier for e-retailers to provide sufficient information regarding the claim, and e-retailers would avoid claims of greenwashing and risk legal issues. At the same time, customers can assess the climate impact of the various delivery options. Lastly, the third category was *Industry Collaboration*. These propositions regard the industry agreement Aster and the measuring method for $CO_2$ emissions, where these concepts will only have the desired impact if numerous e-retailers work together. The industry agreement is a first step towards wider industry collaboration, which can assist in the acceleration of more environmentally sustainable last-mile delivery.

Overall, it was concluded that for e-retailers to offer environmentally sustainable delivery options accurately, they should prioritize sustainability, validate sustainability claims, and collaborate with other companies within the industry.

## 7.2 Practical Contribution

In this thesis, the first practical contribution is to all e-retailers in the e-commerce industry. For e-retailers, this thesis contributes to research on environmentally sustainable last-mile delivery. The empirics gave a holistic overview of how different e-retailers view sustainability depending on whether it is prioritized by the management and the company. This information

can be used to take inspiration from how others work with sustainability issues, but it can also be used to benchmark against competitors. In addition, the thesis outlines what e-retailers have to keep in mind when using sustainability terms at the check-out and what consequences can arise if they are not used correctly. Hence, the thesis provides support for how e-retailers should go forward.

The thesis highlights the importance of industry collaboration, and therefore, the study can contribute to more e-retailers signing the industry agreement. This would standardize the sustainability terms used in the check-out, which would decrease confusion and increase communication between the e-retailer and the customer. Using quantifiable terms in the check-out makes it easier for customers to know the environmental impact of the delivery option they are choosing. Moreover, an industry collaboration to make the industry more sustainable can contribute to increased awareness among customers of which companies incorporate sustainability branding and take sustainability initiatives. A sustainability initiative in the industry could be to establish a comparable measurement for $CO_2$ emissions, which would lead to a more transparent and standardized way to compare emissions. Thus, it would highlight if an LSP truly is fossil-free when new input variables that are calculated similarly throughout the industry are taken into consideration.

Lastly, this study does not only contribute to the e-commerce sector but also to the LSPs. LSPs can use the results and literature review to grasp the importance of becoming sustainable and using resources more efficiently to decrease carbon emissions and traffic jams. Hence, the LSPs should adapt to both customers' geographic regions and every individual order to have the most sustainable last-mile delivery option. In turn, an adaptation of the order could increase delivery efficiency and decrease costs for the LSPs. By offering sustainable delivery options, the LSPs can be one step ahead of regulations and/or laws that are to be introduced that prevent companies from working unsustainably. Hence, there is a belief that this thesis contributes to increased pressure within the transport and delivery industry to become more sustainable.

## 7.3 Theoretical Contribution

The purpose of this thesis was to explore and contribute to research on if, how, and why e-retailers offer environmentally sustainable last-mile deliveries. Previous research has been more focused on either the sustainability knowledge among customers or the environmental impact of last-mile deliveries. This thesis defines environmentally sustainable last-mile deliveries based on definitions by Lim, Jin and Srai (2018), Gevaers, Van de Voorde and Vanelslander (2014), Harrington et al. (2016), and Fulton, Clarke and Albán (2017), and has explored the gap in research on the decision-making of e-retailers regarding environmentally sustainable last-mile deliveries. That was done with a conceptual framework that showed how factors such as sustainability knowledge among the companies, ambiguous terminology, and fear of greenwashing, affect the decision on which last-mile delivery options they choose to offer their customers.

The influence of customers' confusion of sustainability terminology on their shopping behavior has been explored by previous research, as discussed in Chapter 1, Introduction. There it was presented that the lack of knowledge is the factor that influences customers' choice of the last-mile delivery method the most, mainly due to the terminology not being used systematically (Young et al., 2010; Buldeo Rai, Verlinde & Macharis (1), 2018; Lurell et al., 2018; Ignat & Chankov, 2020). However, this thesis showed that this confusion is not limited to the customers but appears among the ones who are responsible for the last-mile delivery options at the e-retailers too. This was shown in multiple ways in the interviews with the e-retailers. Thereby, the issue with the ambiguity of sustainability terms that are covered by previous research was supported by the findings in this thesis too. This further points to the inadequate communication of the environmental impact of last-mile deliveries that occurs when several actors are not certain of the meaning of the terms they are using and are even using the same terms with different definitions. In the interviews, we also detected a gap between how much the companies claimed to value and work with sustainability and what they actually did. Additionally, the mapping showed that the sustainability focus tends to differ between e-retailers in different sectors, something we had not seen in the literature before. Therefore, a contribution to theory was made by submitting eight propositions that highlight the current challenges and opportunities with environmentally sustainable last-mile deliveries for Swedish e-retailers. The purpose of the propositions is to minimize the gap between e-retailers so that the identified challenges do not hinder e-retailers from offering environmentally sustainable last-mile delivery options.

This issue is most likely not isolated to last-mile deliveries in Swedish e-commerce. The finding regarding the sustainability knowledge of e-retailers suggests that there can potentially be a gap in knowledge in other industries too, where an actor offers a "sustainable" service but does not know what they are offering or the actual meaning of the terms they use to promote it. This thesis explored the Swedish e-commerce market, and the same or similar issues may appear in the e-commerce markets of other countries too. Therefore, the propositions presented could be used as a foundation and then adapted for other industries and markets, considering local legislation and other factors that might differ.

## 7.4 Limitations and Future Research

This research has many practical and theoretical contributions, but the thesis limitations have impacted its comprehensiveness. Firstly, this thesis was limited to Lund, and B2B and companies that deliver food were excluded from the study. However, by including both other cities and the excluded companies, another view on the area that was researched could have been given. In addition, only one respondent was interviewed from each of the participating companies, which might not give a representative picture of the e-commerce landscape in Sweden today. The interviewed respondent could be biased, and their opinion may not be in line with the rest of the company. The time with each respondent during the interviews was also restricted, and combined with the fact that one respondent cannot represent the whole company, the results and answers became limited. However, the mapping, together with interviews from the companies and Gunilla Welander, helped to triangulate the data. Thus,

there is a belief that the results and analysis highlighted in this thesis have practical and theoretical contributions to the entire e-commerce industry, and this thesis can act as a starting point for future research.

Given the limitations that were discussed above, there are many opportunities for future research. The first recommendation is to continue the discussion of the concept of sustainability in the last-mile delivery area. The discussion should be communicated between e-retailers, LSPs, and customers to spread knowledge among people regarding the concerns related to environmentally unsustainable delivery services. Awareness programs and regulations created by the public sector, NGOs, and/or governments can help spread knowledge and increase interest in sustainability. Moreover, this raises questions as to why awareness programs or regulations have not yet been set up to make the last-mile delivery process more efficient and to provide e-retailers with more concrete directions on what is expected of them. This implies the importance of continuous research in the area of how e-commerce can become more sustainable. The second recommendation is to continue the research on the reasoning behind why only 34.7% of the largest e-retailers in Sweden offer environmentally sustainable last-mile delivery at the check-out. Do 65.3% of the e-retailers not offer sustainable last-mile deliveries at check-out because they are afraid of being accused of greenwashing, or do they not prioritize sustainability? Are there any other factors contributing to this? Lastly, since it was found in this thesis that all e-retailers within the beauty sector and only one e-retailer within the home and house sector offer sustainable last-mile delivery options, it would be of interest to conduct future research on the difference in sustainability focus within the various sectors.

## 7.5 Reflection

To summarize, we reflect on the methodology, learnings, and processes from writing the thesis. Before this thesis, we had some previous knowledge about sustainability and last-mile deliveries from prior courses at the university. The sustainability perspective is an important topic of discussion in today's situation, and when looking at e-commerce, it is expected to grow significantly in the future. Therefore, sustainable delivery options in e-commerce are becoming an increasingly important challenge for society to deal with, and there is a gap in this field, which was the reason why we wanted to investigate the phenomenon of why and how e-retailers offer sustainable last-mile delivery options. However, we did not have any prior knowledge regarding e-retailers' decisions to offer sustainable last-mile delivery, and thus, a large amount of time was spent at the beginning of this thesis to build an understanding of the subject.

The data gathering and the interviews provided insight into how e-retailers think of sustainability and last-mile delivery, but they also gave an insight into how much the participants have reflected on the questions asked. Some of the respondents were more likely to float out and discuss other topics than the question, whereas others could give a more clear and concise answer. Hence, the respondents' answers were in many cases very different, and factors such as *"No Comparable Measurement for CO2", "Fear of Greenwashing",* and *"Competitive Aspect"*, were only mentioned a few times by some respondents. In addition,

there is not much theory about these three factors, which is why the analysis of them was not very long.

Finally, we have learned a lot about e-commerce, sustainability, and last-mile delivery. We believe that there are a lot of factors that play a huge role when deciding on last-mile delivery options for e-retailers. However, it seems that many e-retailers tend to see sustainable last-mile delivery more as something to boost sales than as something important for Sweden to achieve its climate goal. Hence, many e-retailers do not have sufficient knowledge about the terminology that is being used or seem to prioritize and/or care if the LSPs' environmental claim has any bearing on it. Therefore, there is a need for more research in this area to help e-retailers offer environmentally sustainable last-mile delivery options accurately without any interference from the mentioned factors that lead to information failure.

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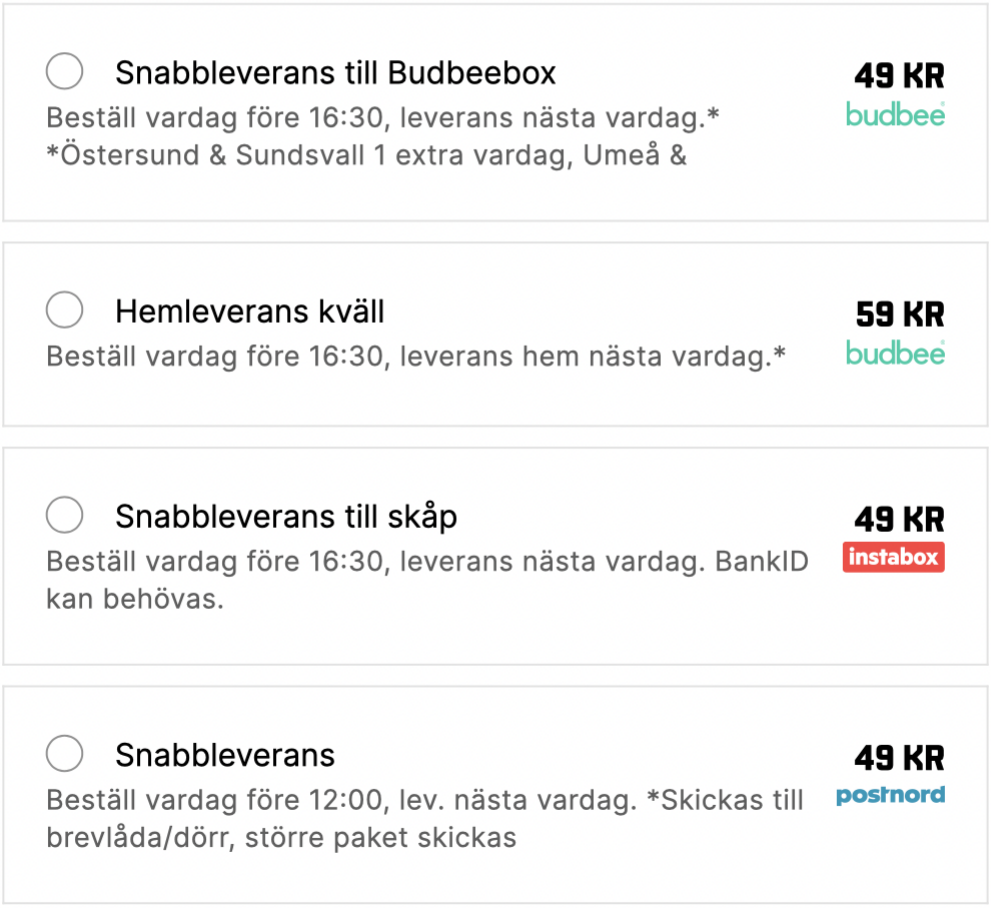
# Appendix

## Appendix A - Number of Results for Different Searches in LUBsearch

| Search term | Total number of search results | Filter: Academic Journals | Filter: Peer-Reviewed | Filter: Academic Journals, Peer-reviewed |
|---|---|---|---|---|
| Last-mile delivery | 7672 | 3909 | 4248 | 3739 |
| Last-mile delivery customer | 1901 | 1035 | 1143 | 977 |
| Last-mile delivery e-commerce | 1543 | 916 | 981 | 881 |
| Last-mile delivery company | 1601 | 449 | 530 | 428 |
| Last-mile delivery e-retailer | 23 | 17 | 14 | 14 |
| Sustainable last-mile delivery | 617 | 399 | 450 | 396 |
| Sustainable last-mile delivery customer | 185 | 128 | 143 | 127 |
| Sustainable last-mile delivery e-commerce | 162 | 111 | 129 | 109 |
| Sustainable last-mile delivery company | 151 | 46 | 83 | 46 |
| Sustainable last-mile delivery e-retailer | 6 | 6 | 4 | 4 |
| Environmental last-mile delivery | 1024 | 802 | 848 | 782 |
| Environmental last-mile delivery customer | 225 | 171 | 198 | 170 |
| Environmental last-mile delivery e-commerce | 317 | 253 | 262 | 245 |
| Environmental last-mile delivery company | 163 | 98 | 117 | 96 |
| Environmental last-mile delivery e-retailer | 4 | 4 | 3 | 3 |

# Appendix B- Different Delivery Options



Budbee Box Fossilfri
**19 KR**
budbee
25 januari ~ 16:00
Gratis vid köp över 500:- Legitimering via BankID kan behövas.

Postnord Ombud Fossilfri
**29 KR**
postnord
Preliminärt leveransdatum: den 25 januari

Instabox Express Fossilfri
**49 KR**
instabox
Imorgon ~ 16:40
Expressleverans till paketskåp. Legitimering via BankID kan behövas. 29kr vid köp över 500kr.

Instabox Home Fossilfri
**39 KR**
instabox
Imorgon ~ 16:00 - 22:30
Hemleverans kvällstid med Instabox.

Budbee Home Fossilfri
**39 KR**
budbee
Preliminärt leveransdatum: den 25 januari

Ekonomifrakt Fossilfri
**0 KR**
Preliminärt leveransdatum: den 31 januari

# Appendix C- Interview Guide

**Introduction**

Please tell us about your background and role in last-mile deliveries.
Please tell us about the company you work for now.

**Part 1: Sustainability**

1. How does your company view sustainability?

2. How important is sustainability to you?

3. How do you work with it?

4. How much knowledge of sustainability do you think the company has?

**Part 2: Decisions regarding environmentally sustainable delivery options**

5. Which delivery companies for last-mile delivery do you have an agreement with?
    a. Who decides who to contract (e.g., management, logistics manager)?
    b. Who manages these contracts?
        i. How often is the offer revised/contracts renewed?
    c. How is this determined and what is it based on?
    d. What does the decision-making process look like?

6. How do you decide and what determines which delivery options you offer from each company?

7. How is the order of delivery options/delivery companies determined at check-out?
    a. How does the negotiation between the parties take place?

8. How are the different delivery options priced?

9. Do you have statistics on which options are most popular?

10. Do you have an idea of why customers choose the delivery options they do?

11. Who is responsible for how the delivery options are presented to the customer at check-out?

12. Who formulates the presentation of the delivery options?
    a. Who decides the terminology?
    b. How is the terminology determined?
    c. Has your company decided to use specific terms?

13. Why do you choose to write out or not write out a term for sustainable delivery options?

14. What do you think is the reason why some e-commerce companies do not offer sustainable last-mile deliveries?
    a. What factors are there?

15. How much information regarding the sustainability of delivery companies do you get?
    a. Do you follow up and check their promises?

16. Why do you think that sustainability work varies so much between delivery companies? (e.g., some advertise that they have a completely fossil-free supply and others do not)

17. How do you see the future of last-mile deliveries?

18. What is a sustainable last-mile delivery for you?

19. How would you define:
    a. Fossil-free?
    b. Climate offsetting?
    c. Environmentally friendly?
    d. Climate-smart?