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What is the future of emission data? A study of environmental purchasing criteria in the heavy road freight transport industry in Sweden

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Abstract

Heavy road freight transports in Sweden are responsible for a significant portion of national greenhouse gas emissions. Earlier research has looked at the purchasing process of transports in a business-to-business context and established its importance for limiting environmental impact. This thesis' purpose is to study purchasing criteria related to the climate and explore the potential use of emission data as a criterion.

In order to gather data, interviews were conducted with transport operators and customers (large companies) within the forest, food, and construction industry. In total, 12 interviews were done with employees connected to the purchasing process (or selling for operators). A theoretical model was also developed, continuing earlier efforts to explain the process of a purchaser choosing transport provider.

The results include nine number of criteria related to environmental impact, used as either qualifier or order-winner depending on the interviewed company. Regarding adoption of emission data as a purchasing criterion, several drivers; enablers; and barriers were identified. First, example of drivers were customers' demand and internal management. Second, new technology was a mentioned enabler. Third, the lack of standardization was identified as a major barrier – which supports current initiatives to further develop emission standards, CountEmissions EU being one of these.

Finally, to further progress the advancements made in this thesis future research is suggested to look at environmental purchasing criteria of SMEs and additional customer segments.

Keywords: Emission data, purchasing, GHG emissions, road transport, Sweden, environmental purchasing

Glossary

Barriers: Factors obstructing the environmental advancement

Carriers: The companies owning the trucks and offering freight transport as a service

Competitive advantage: A company's advantage over its competitors. Can be achieved either by differentiation or lower costs (offering the customer a lower price); i.e., offering higher value than competitors

Differentiation: A competitive strategy which entails offering the customer a product/service with more benefits compared to the competitors

Drivers: Factors pushing for environmental performance

Emission data: Numerical values related to emissions of greenhouse gases, e.g., kg CO_2e/tonne-km

Enablers: Factors required for environmental consideration, i.e., factors enabling environmental considerations

Environmental management: Management of environmental systems and activities regarding environmental quality

Environmental purchasing: Purchasing of products/services with less negative effects on the environment compared to competing options

Euro Class: European emissions standards which classify vehicles, consist of different stages labelled from Euro 1 (introduced 1992) to Euro 6 (introduced 2014) – it regulates emissions levels for primarily local pollutants (PM, NOx, CO)

Green marketing: The marketing of products and services to reduce or prevent environmental impact

Green washing: A company's activities to make people believe their environmental work is better than it is

Heavy trucks: Trucks with a total weight of over 3,5 tonnes

ISO 14001: International environmental management system certification which provides a formal and systematic approach for organizations to decrease their impact of the environment

ISO 50001: Certification for businesses devoted to tackling their impact, through effective energy management

Order-winners: The criteria considered which will potentially win orders versus competitors

Qualifier: The criteria considered which enables the company to be active in a market, but not to ultimately win orders

Shippers: The companies buying freight transported when they need something shipped

SMEs: Small and medium sized enterprises

Transport operators: The companies owning the trucks and offering freight transport as a service

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1 Introduction

This chapter introduces the background of the master's thesis; followed by the main purpose and research questions. After, a review of the chosen delimitations and the thesis' outline is included.

1.1 Background

Most people are aware of environmental issues stemming from today´s transport solutions. While cars and airplanes are part of the problem, freight transports by heavy trucks account for a significant share of Sweden's yearly greenhouse gas emissions (Naturvårdsverket, n.d.). However, many domestic companies (especially of larger size) which are the purchasers of the transport services are now setting goals and strategies for reducing their climate impact. To facilitate this new direction, calculation of emissions has increased, and more companies are publishing sustainability reports. With all this in mind, it is topical to research which environmental aspects that are considered today in the purchasing of freight transport and the potential use of emission data as a purchasing criterion.

Combating climate change is vital for the well-being of humanity according to the UN (United Nations, n.d.). As of today, of all goods transported in Sweden, 80% is so by trucks (Sveriges Åkeriföretag, n.d.). This translates to heavy trucks accounting for just over 3 million tonnes CO_2e (carbon dioxide equivalent) or approximately 7% of national greenhouse gas emissions (Naturvårdsverket, n.d.; Sveriges Åkeriföretag, n.d.). While emissions have steadily declined since its peak 2007, mainly thanks to more renewable fuel and higher energy efficiency, over 95% of heavy vehicles are still powered by diesel (Naturvårdsverket, n.d.; Sveriges Åkeriföretag, n.d.). Sweden has set a national goal to reduce domestic transport emissions by 70% in 2030 (compared to 2010) (Naturvårdsverket,

n.d.). Comparing 2020 with 2010, emissions from heavy trucks have decreased by approximately 37% – so there is still progress need to be made.

Environmental aspects can be found in customers' choices and today's marketing. According to a survey conducted in 2021 ordered by Deloitte, 32% of consumers in the UK were willing to pay more for a product or service that offered lower carbon footprint (Deloitte, n.d.). Consumer's increased interest of battling climate change can also be seen in countries as USA and China (*The Climate Decade*, n.d.). In a business-to-business (B2B) context *green marketing* has showed proof of higher satisfaction with customers (Gelderman et al., 2021).

The trucking industry in Sweden is primarily a service industry conducting transports for customers (rather than everyone owning their own trucks) (Trafikanalys, 2022). The customers of freight transports are organizational, professional buyers often having relatively structured purchasing processes for transporting services (Lammgård, 2007). This is of interest because one way of reducing environmental impact from transports is to use environmental criteria in the purchasing process (Björklund, 2005).

There are several existing studies about the purchasing process of freight transport, also related to environmental aspects. Worth mentioning are certain publications by Swedish researchers. Lammgård (2007) established a framework (with a corresponding model) for exploring the potential use of environmental arguments in purchasing of freight transports. Lammgård together with Andersson (2014) have also examined the purchasing criteria of freight transport buyers, including the trade-offs between price, delivery time, delivery precision and environmental efficiency (CO_2). Finally, Björklund (2011) examined factors influencing purchasing of green transport services.

The use of environmental data in marketing is also interesting for transport companies when competing in their markets. Pursuing a strategy based on

environmental factors can be called environmental *differentiation* (Roy & Vézina, 2001). However, according to Porter, it is common that companies' efforts in the area are mostly for pleasing stakeholders rather than actually benefitting the business model (Porter et al., 2019). Therefore, the opportunities to create a *competitive advantage* through ESG-activities are often missed. Lammgård (2007) presented a variety of potential differentiation strategies in her research of transport – including lower environmental impact by emitting less. Companies that have worked successfully with a strategy to reduce CO_2 emissions can use this in their marketing of products and services to gain a competitive advantage (Lammgård & Andersson, 2014).

Adding to this, companies in Sweden are reporting climate impacting emission data from their businesses to an increasing extent (2050, 2020; Persson, 2019). Earlier research has put the foundation and confirmed the importance of understanding the environmental perspective of purchasing of freight transport. However, much of this was conducted around ten years ago. With climate impact getting more attention in the society and the overall development in the environmental area progressing rapidly, it is of high value to keep the academic knowledge up-to-date and continue the research.

1.2 Main purpose

The purpose of the thesis is to examine the different purchasing criteria related to climate impact in the purchasing process of heavy road freight transport in Sweden, as well as the potential for using emission data as a purchasing criterion.

1.3 Research questions

1. What purchasing criteria are currently being used in the purchasing of heavy road freight transport that are related to climate impact in Sweden?

2. Are these criteria currently used as qualifiers or order-winners in Sweden?
3. What drivers, enablers and barriers do buyers and sellers recognize currently exist for the use of emission data as a purchasing criterion for heavy road freight transport in Sweden?

1.4 Delimitations

This study focuses on freight transport (business-to-business) in the heavy road transport industry. More specifically, in Sweden and the Swedish business environment, and the three major industries: construction; food; and forest. Moreover, the interviewed market participants were limited to employees of buyers and sellers of road freight transport with direct insight into the purchasing/selling process. Only employees of larger companies (revenue of >1 billion SEK) were represented.

1.5 Disposition of the master's thesis

Chapter 1

This chapter introduces the background of the master's thesis; followed by the main purpose and research questions. After, a review of the chosen delimitations and the thesis' outline is included.

Chapter 2

The chapter covers prior research relevant for the thesis. The chapter is divided into two parts: first, purchasing criteria used in freight transport and related research; second, how different factors influence environmental purchasing.

Chapter 3

The chapter starts with a brief overview of purchasing in an organizational context. Next, a summary of a theoretical model of environmental aspects in purchasing of freight transport by Lammgård is provided. This model was used as foundation during the development of this thesis' framework and model. The next part covers customer value and customer-perceived value, two critical ideas for how purchasers make their decisions. Following that, Hill's theory of categorizing purchasing criteria into qualifiers and order-winners is examined. Finally, before presenting the proposed model, how competitive advantage ties into this is discussed.

Chapter 4

The chapter starts with describing the thesis' research strategy and research design. That is followed by a detailed explanation of the work process. This includes the literature review, empirical data collection, and how the analysis was done. Afterward, a discussion of an alternative approach for data collection is provided. The chapter ends with examining the thesis' validity and reliability.

Chapter 5

The chapter clarifies certain concepts mentioned during the interviews which are of importance to understand within the context. They are related to the road transport industry and green marketing. The concepts are (in order): sustainability reporting; standards for calculation and reporting of emissions; carbon footprint labels; greenwashing; the greenhouse gas reduction mandate.

Chapter 6

The results from the interviews with Swedish shippers in the forest, food, and construction industry along with large transport operators are presented. First, findings are presented based on the research questions and subcategorized by the industry of the shippers. Second, the findings from the interviews with the transport sellers are presented.

Chapter 7

The chapter discusses the findings in the results section, research question by research question. A constructive and critical discussion and validation of the thesis' proposed model is thereafter provided.

Chapter 8

The chapter raises the concluding remarks of this master's thesis. A summary of the thesis is included with the most important parts from results and discussion. After, research and managerial implications are highlighted. The final conclusions look at limitations and give suggestions for future research.

2 Prior research

This chapter covers prior research relevant for the thesis. The chapter is divided into two parts: first, purchasing criteria used in freight transport and related research; second, how different factors influence environmental purchasing.

2.1 Purchasing criteria in freight transport

Several studies have examined environmental aspects connected to the purchasing function.

IVL Svenska Miljöinstitutet (together with Gothenburg University and Chalmers Institute of Technology) conducts a biannual survey of transport purchasing in Sweden (Styhre & Andersson, 2020). Lammgård & Andersson did a deeper analysis of the results from the survey in 2012 (Lammgård & Andersson, 2014). When asked to attribute importance to the four aspects: price; transport time; time precision; and environmental efficiency (CO_2), price had top priority and environmental efficiency lowest (with an average weighting of 8,1%). Of all responders, 30% didn't consider environmental efficiency at all. Furthermore, environmental efficiency had not increased in importance since 2003. The authors highlighted that *"there is a significant difference in the attributed importance to price between the group of shippers who pay attention to environmental efficiency and the minority of shippers that do not consider environmental efficiency at all (30%)"*. The 30% group instead heavily adjusted towards price as focal point. The authors saw that even though the society at large sees environmental aspects as more important, the data from the surveys highlight environmental characteristics as having a "*consistently low level of importance when buying transport services"*.

Regarding purchasing criteria Lammgård & Andersson (2014) instead conclude that reliability and quality are most decisive. Closely behind is "*the ability of*

transport providers to cover the shipper's market area in a sufficient manner", alongside price (cheapest).

The last published survey results from IVL Svenska Miljöinstitutet was published in 2020 Sweden (Styhre & Andersson, 2020). The results of the same question as above can be seen in comparison in Figure 1.

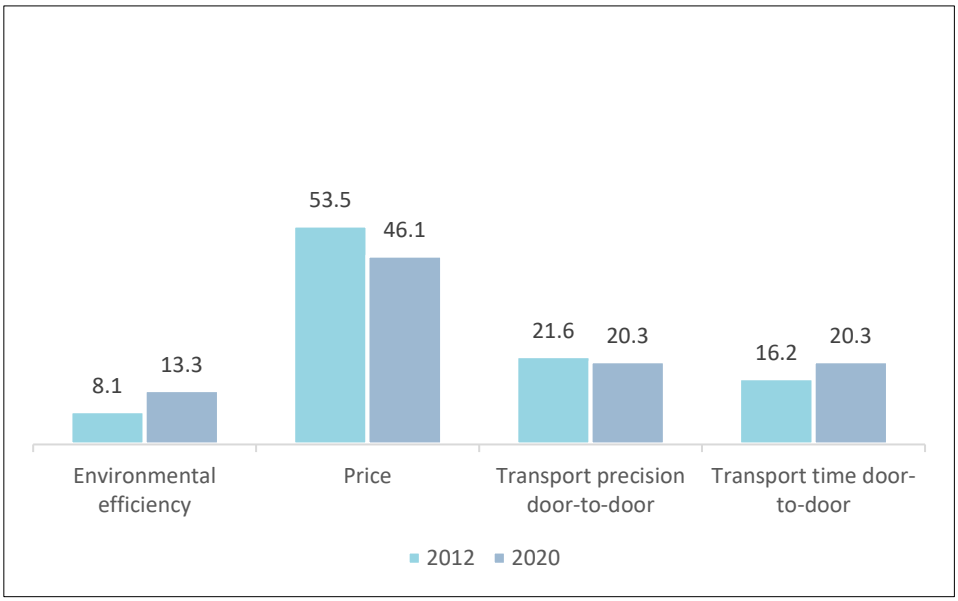

Figure 1: Buyers attributed importance of four aspects, authors' diagram created from external data (Lammgård & Andersson, 2014; Styhre & Andersson, 2020)

In contrast to the comparison of 2003-2012 there is now a notable difference in the results. Environmental efficiency (and transport time) shows an increase in importance for responders at the cost of price. They were also asked if they (to any extent) voluntarily pay a higher price for more environmentally friendly transport. The results showed that 19% answered yes, 63% no, and 18% did not know.

Lammgård (2007) conducted a doctoral thesis examining environmental perspectives in freight transport. She concluded that larger companies (>100

employees) cared more about environmental factors (specifically CO_2 emissions) and less about price than smaller companies. The larger companies had dedicated environmental departments and worked actively with the environmental aspects of transport. Still, she also identified that, in general, different departments in the companies often had conflicts regarding environmental concerns, often originating from the financial side. Four types of influential factors were identified by Lammgård as motivations for environmental considerations: business aspects; transport context; internal environmental pressures; and finally external environmental pressures. Figure 2 below presents the model.

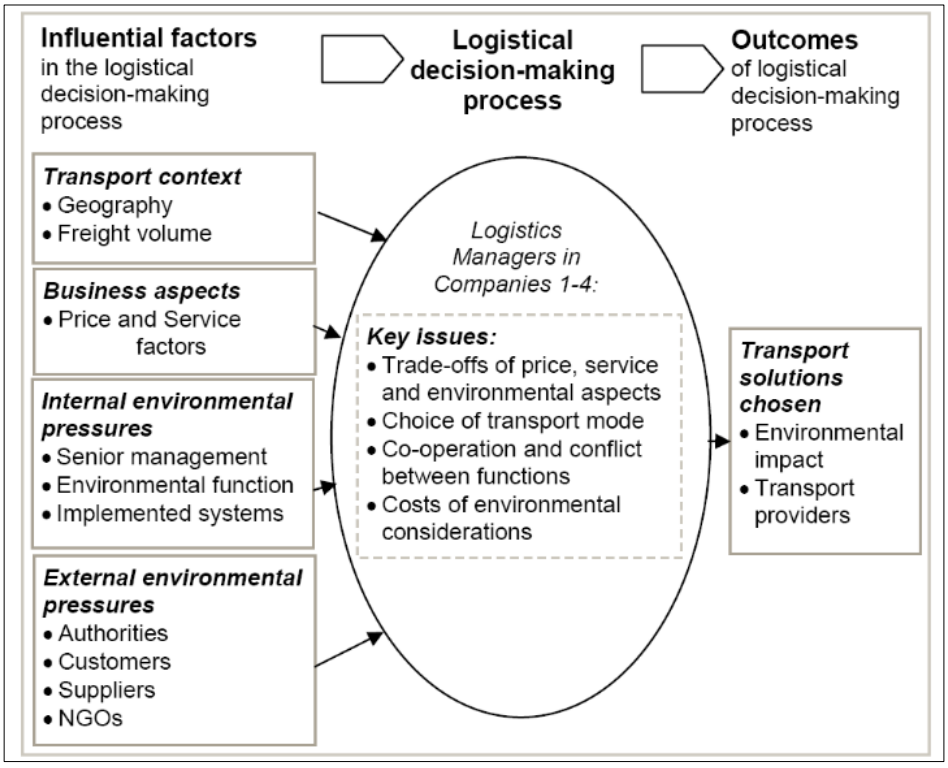

Figure 2: Lammgård's (2007) final model of environmental aspects in purchasing

The purchasing of transport typically came with trade-offs for the customer (Lammgård, 2007). Lammgård stated that while price is important, it does not necessarily have to be the lowest price. Instead, the customer cares most about the quality of the service meeting minimum requirements. Another finding was that customers who valued environmental aspects higher also valued the availability of more environmentally friendly options higher (in this case other modal choices, e.g., railway). There were also indications that the (end) consumers have the final purchasing power in the supply chain. In this context, consumers seemed most concerned when it came to food products (of the sampled industries).

2.2 Influencing factors of purchasing criteria in freight transport

A researcher that has examined the intersection of environmental purchasing and influential factors in Sweden is Björklund (2011), who highlighted that attention to environmental factor is becoming more critical for continued success in purchasing. Björklund examined with a survey which distinct factors can be influential in environmental transport service purchasing. After first grouping up the different factors into broader categories, she concluded that internal management, company image, customer demands, carriers, government and authorities were of greatest significance. Overall, the external factors appeared to be more influencing than internal ones. The study also attempted to categorize the factors as drivers (factors pushing green performance), enablers (factors required for environmental consideration) or barriers (factors obstructing the advancement, i.e., barriers). Overall, the major findings were (1) environmental management; management; reputation of the firm; company and product image; and customer's environmental demands as drivers; (2)

management and carriers being important as enablers; (3) customers' non environmental demands being a barrier.

Multinational companies based in US were researched to identify drivers and barriers of sustainable purchasing and supply management (P/SM) (Giunipero et al., 2012). For the drivers, an overall conclusion was that it varied depending on the organization. The two strongest drivers were top management and compliance with laws and regulations. On the other side, the two strongest barriers were initial investments needed and economic uncertainty (during the period of empirical data collection there was an ongoing recession). This supported a statement that sustainability is considered to bring costs in the short term and that it takes longer to reap benefits.

Walker et al. (2008) conducted an exploratory study to identify drivers and barriers to environmental supply chain management. They found drivers and barriers both internally and externally of the organizations. The drivers were generally common across multiple organizations while there was a larger variety of barriers. One thing they noted was that suppliers were not identified as significant drivers; however, it could have been explained by the relatively large organizations participating skewed the power balance in the relationships.

Philipp and Militaru (2011) did an explanatory survey study in France. The scope was to understand the shippers' attitude to purchasing of more ecologically friendly transport services. They found that company-specific antecedents had higher influence on the purchasing than relational aspects and regulations.

Eng-Larsson and Norrman (2014) looked at freight transport and the shift to more intermodal solutions, and more specifically, when logistics service providers are choosing transport mode. One driver for intermodal solutions is it being more environmentally friendly and therefore anticipated to grow in popularity when society becomes greener. However, the progress so far had

been modest. The identified barrier of progress was the contracts used for freight transport. They are often framework agreements where the transport seller promises a certain capacity. This resulted in the transporter taking all risk related to less demand (capacity risk), which negatively impacts financial results. The consequence of this was trucks being more advantageous and favored than trains. In summary, the study points out the importance of understanding how the businesses operate and how existing practices can be problematic for the transition to environmentally preferred operations.

3 Theoretical framework

This chapter starts with a brief overview of purchasing in an organizational context. Next, a summary of a theoretical model of environmental aspects in purchasing of freight transport by Lammgård is provided. This model was used as foundation during the development of this thesis' framework and model. The next part covers customer value and customer-perceived value, two critical ideas for how purchasers make their decisions. Following that, Hill's theory of categorizing purchasing criteria into qualifiers and order-winners is examined. Finally, before presenting the proposed model, how competitive advantage ties into this is discussed.

3.1 Purchasing in organizations

Purchasing has gained attention for being a critical, and strategic commercial activity for a business. According to Palmer (2013), there are two needs being met when organizations buy services – the formal needs of the organization and the needs of all the individuals that make up the organization. The latter are influenced by their own perceptual and behavioural environment – like a private consumer. The likelihood of a formal buying procedure is also higher, but not mandatory. Typically, it can range from a junior employee doing simple reorders of services to multiple employees conducting a full process including evaluation and bidding. The more complex purchases often take a longer period to finalize, a consequence of involving multiple people. Palmer also points out that the purchasing criteria of organizations probably are different from the ones of individual consumers. Relationships are also important in the purchasing process for services in business-to-business. The two major reasons being risk-aversion and a desire to solve shared problems together. According to Grönroos (1990), there is a correlation between the complexity of the service in question and the need for trust and confidence; a more complex service requiring higher levels.

The research field developed in the 60s and 70s with the idea of observing organizations' purchases as a series of stages (Sanderson et al., 2015). By putting

emphasize on the individual actors involved (often multiple), the intraorganizational politics come into light. Consequently, organizational sociology is a core concept in the field. Some researchers, Wilson being a prominent one, have later argued for a higher focus on relationships (Wilson, 1996). Others, Tanner for example, maintains that there is still evidence for the validity of the more traditional models (1999).

Typically, multiple people are involved in the purchasing of services in organizations (Palmer, 2013). To tailor the service and promotional messages as a seller, it is advised to identify the key players in the process. There are five types of buyer roles that can be involved in the process, those are presented in Table 1 (Kotler et al., 2016).

Table 1: The five typical buyer roles in organizational purchasing (Kotler et al., 2016)

Role	**Description**
Influencers	Can participate in defining specifications and provide information for evaluating options. Can be for example technical personal or experienced employees.
Gatekeepers	Control the flow of information. Can for example be purchasing agents who decide if salesperson can contact deciders.
Buyers	Formal authority to select supplier and arrange terms of purchase. Take major part in selecting vendor and negotiations, and sometimes also influence specifications.
Users	The people who will use the service. Often, they initiate the buying proposal and help define product specifications. Can be wise to approach first as they might pressure the managers.
Deciders	Formal or informal authority to decide or approve the final suppliers. Buyers are often either deciders or approvers in routine purchases.

According to Palmer (2013), the gatekeepers can often be difficult to identify, creating challenges in how to develop the marketing strategy. The same applies for the decision-maker.

3.2 Original conceptual model

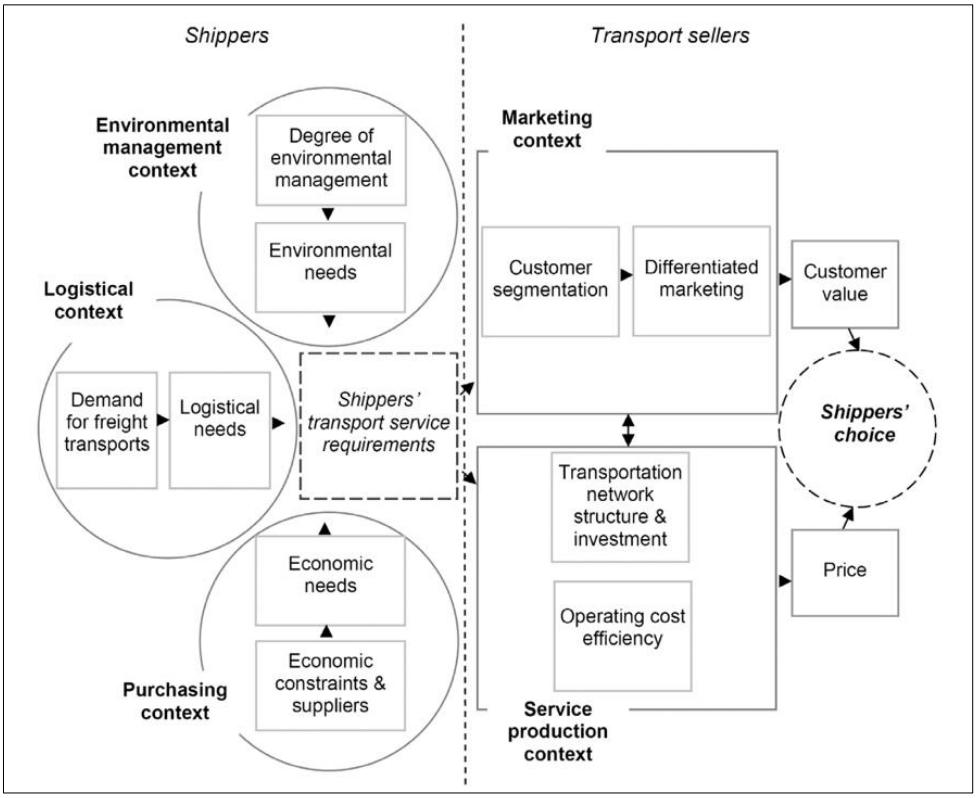

Figure 3: Lammgård's (2007) theoretical model

Lammgård (2007) has developed a conceptual model (based on a theoretical framework) regarding the marketing of transport services; bringing together marketing, logistics, purchasing, and environmental management theory. See Figure 3. It can be used to analyse how to create customer value for the transport buyers and which customers to target with environmental marketing. To use and take advantage of environmental arguments in marketing, the model highlights the necessity of understanding the customer and how it evaluates environmental aspects. The customer makes the choice based on a trade-off of customer-

perceived value together and the price. The requirements of the customer are based on the following three contexts:

- Environmental management: companies are not equal in their progress of environmental management, for example in implementation of EMS. This affects how environmental needs are considered in the purchasing.
- Logistical: the logistical needs depend on how the customers' freight flows. For example, freight volume and time constraints.
- Purchasing: the financial needs of the shipper, i.e., primarily price.

The needs of the specific customer is unique – but based on these three contexts.

Taken together, Lammgård's model is therefore a relevant point of departure in establishing the theoretical foundation of this thesis. In order to answer the research questions and explain the theories applied to further develop Lammgård's work, the theory of customer value; influential factors; and buying criteria are further discussed and expanded below.

3.3 Customer value

The concepts of customer value and customer-perceived value are important. In the traditional theory, customer value derives from the value the customer would get from a product's or service's attributes (Ravald & Grönroos, 1996; Woodruff & Flint, 2003). Examples of these attributes could be quality, price, and delivery time. The customer value would be all the positive attributes of the product (e.g., quality) subtracted by the potential negative ones (e.g., price). Customer-perceived value is how each customer evaluate the offer and therefore varies (Kotler et al., 2016). Customer-perceived value is ultimately how the shipper chooses the transporter (Lammgård & Andersson, 2014). An example relevant to the context of this study is a shipper that has worked for a long time with environmental management (Lammgård, 2007). It is likely that this shipper

would see higher perceived value from an environmentally friendly transport option than a shipper that has not worked with environmental management.

Understanding customer value and its origin helps with creating a more nuanced sense of how customers make purchasing choices, rather than the process being like a black box. First of all, customer value in a business-to-business context can be separated into two categories: functional value and relationship value (Woodruff & Flint, 2003). The former is founded in aspects as quality and price. The latter is instead based on the interactions between the seller and the buyer, for example the salesperson and the buyer agent.

Continuing, theory suggests that the sought attributes are connected to desired consequences of the customer; i.e., "*attributes are desired by customers only when they lead to consequences that the customer wants to have happen in its own use situation*" (Woodruff & Flint, 2003, p. 520). The wanted consequences are in turn based on what end states the customer wants to achieve, in other words, the goals of the customer. This is referred to as customer value hierarchy, an expanded concept of customer value. See Figure 4.

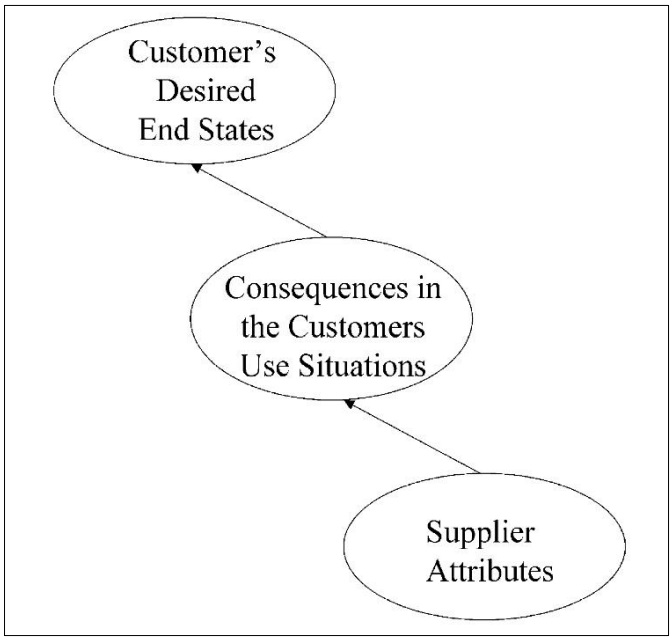

Figure 4: The customer value hierarchy (Woodruff & Flint, 2003)

According to Woodruff & Flint (2003), the concept of customer value should be described as the customer's own preference for and evaluation of the product's/service's attributes and linked consequences. This idea contributes an explanation of where the customer value comes from and suggests that sellers should focus on the customer and what the customer can achieve with the offer, rather than solely the attributes themselves.

This concept of customer value hierarchy works in both directions (Flint et al., 2002; Woodruff & Flint, 2003). First as described earlier: (1) the customer knows the sought end states; (2) the customer links this to desired consequences which the product/service should accomplish to lead to this state; and finally, (3) the consequences are linked to desired attributes that should facilitate the wanted consequences. However, in addition to this it also works the other way around as a feedback-loop. (1) After the customer has bought a product/service the

consequences of the chosen alternative will become known. The customer's opinion of these consequences and how they matched prior expectations can affect the desired attributes which will be used for the next purchase. (2) Likewise, the customer will also experience which end states the realized consequences led to. This will result in the desired consequences being adjusted for the next purchase. To summarize, the feedback-loop means that the customer is learning with each purchase.

What the customer values also shift over time (Woodruff & Flint, 2003). This implies that the customer will likely pick a different product/service to buy over time. It is also an explanation for a customer's desire to find, develop, and end relationships with suppliers (Flint et al., 2002).

In the early 2000s a study was done to investigate how business-to-business customers' desired value change (CDVC) (Flint et al., 2002). They concluded that all the levels of the hierarchy change over time (attributes, consequences, and to less extent, end states). The authors identified emotions as being a saliant factor when CDVC occurred. Typically, the emotions were negative (e.g., panic, pain, sense of urgency) and summarized as a feel of tension. The emotions could trigger CDVC as be a problem-solving solution. The model they proposed for CDVC can be seen in Figure 5.

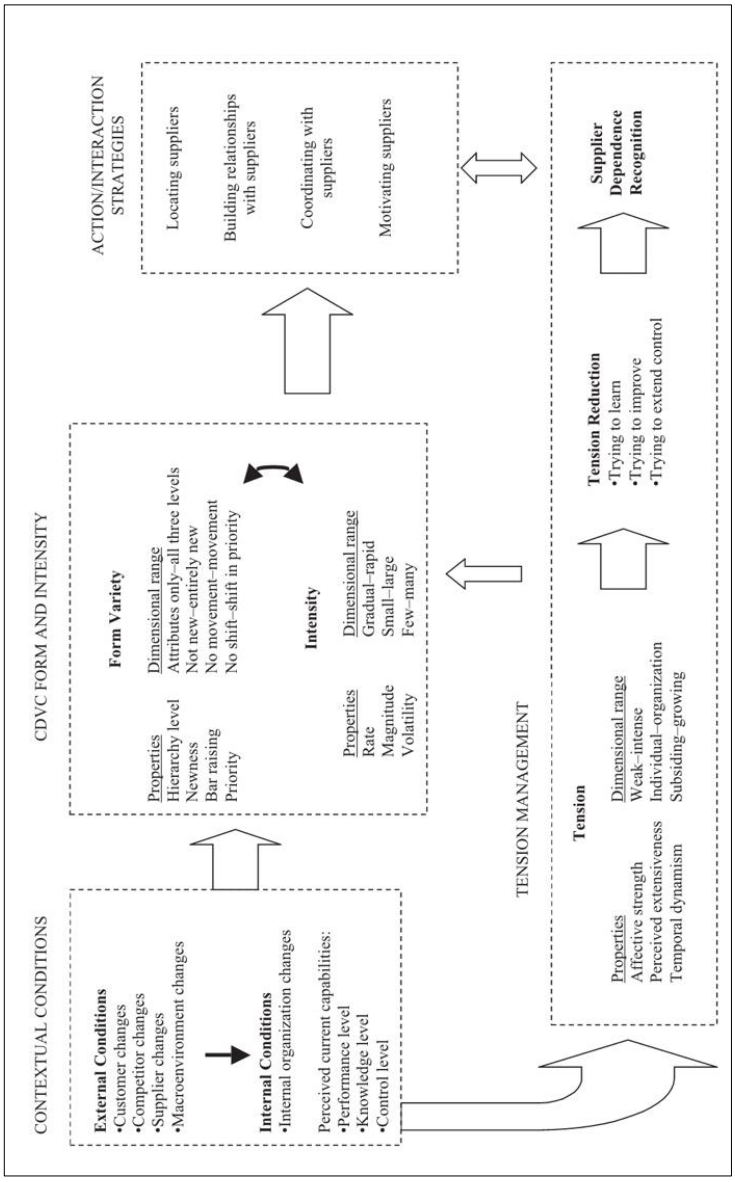

Figure 5: Proposed model of CDVC (Flint et al., 2002)

Two sets of contextual conditions were found linked to CDVC (Flint et al., 2002). The first set being external conditions: customers' customers' desires; customers' competitors' strategies/tactics; suppliers' offerings and performance; and customers' macroenvironment. The second set were the internal conditions:

organizational changes; recent performance; knowledge levels; and finally, levels of control. The conditions are listed below in Table 2:

Table 2: Contextual conditions linked to customers' desired value change (CDVC) (Flint et al., 2002)

Sub-category	**Condition**
External	Customers' customers' desires
	Customers' competitors' strategies/tactics
	Suppliers' offerings and performance
	Customers' macroenvironment
Internal	Organizational changes
	Recent performance
	Knowledge levels
	Levels of control

Kotler (2016) lists four major influences on business buying participants: environmental, organizational, interpersonal and individual. Comparing Table 2 with Table 3 a salient overlap can be distinguished.

Table 3: Major influences on business buying participants (Kotler et al., 2016)

Category	**Examples**
Environmental	Economic developments Supply conditions Technological change Political and regulatory developments Competitive developments Culture and customs
Organizational	Objectives Policies Procedures Organizational structure Systems
Interpersonal	Authority Status Empathy Persuasiveness
Individual	Age Income Education Job position Personality Risk attitudes

The influences can be categorized as either drivers, enablers, or barriers (Björklund, 2011). The drivers push the progression; the enablers are a necessity for the progression; and the barriers stop or slow down the progression.

3.4 Qualifiers and order-winners

For the purchaser it is often about making trade-offs between desired attributes. For example, the use of more renewable fuel comes with a higher cost which is generally paid by the buyer. Terry Hill coined the terms qualifiers and order-winners, a way to divide and distinctively clarify buying criteria (Vastag, n.d.). These are essential for the seller to identify in order to set the company strategy both in theory and in practice (Hill & Hill, 2009).

Qualifiers are the criteria which enables the company to be active in a market, but not to ultimately win orders (Hill & Hill, 2009). Hill & Hill call them *order-losers*, referring to the fact that failing to reach the qualifiers can lose orders to competitors, but succeeding will unlikely win the order. The qualifiers can subsequently be split into qualifiers and order-losing sensitive qualifiers. Hill & Hill further argue that the latter are vital to keep in check, as failing to do so can be highly detrimental and result in quick loss of business.

Order-winners on the other hand is the factor which will potentially win orders versus competitors (Hill & Hill, 2009). Importantly, there is a difference in how to approach the order-winners. For qualifiers, the goal is to match the customer's requirements, for order-winners, the goal is instead to beat the competitors and offer the customer something better.

Qualifiers are not of lesser importance than the order-winners (Hill & Hill, 2009). To be considered a potential supplier by the customer is of course critical for business. The different criteria are not fixed, instead they change over time and depends on the specific market. They are also different for each customer. In addition, they also depend on the situation. First, if a company is market-driven or market-driving. Second, the relevance and importance of the criteria will be different for retaining market share, grow market share, or enter new markets.

3.5 Competitive advantage

As stated in chapter 1, offering the customer higher value compared to competitors is a cornerstone in building a competitive advantage (Kotler et al., 2016; Ravald & Grönroos, 1996). Either by giving more benefits to the customer or taking a lower price. Service companies today can experience intense pricing competition. According to Kotler, a service company have 3 main marketing missions to avoid this. Those are: increased service differentiation, increased service quality and increased service productivity.

The increased service differentiation can be created in offer, delivery and image (Kotler et al., 2016). The offer can for example include innovative features that competitors' do not have and the delivery having superior customer-contact. Better service quality means to simply give the customers a higher level of quality of the service. However, it can often be considered difficult to achieve consistently and sometimes also hard to define what it should look like. Finally, increased service productivity can be accomplished through ways like hiring more skilled employees or industrializing the service.

In the next part the theoretical model of the thesis will be presented, based on the different theories in this chapter. The model covers the customer's decision-making process and the theory relevant to answer the three research questions.

3.6 Proposed model

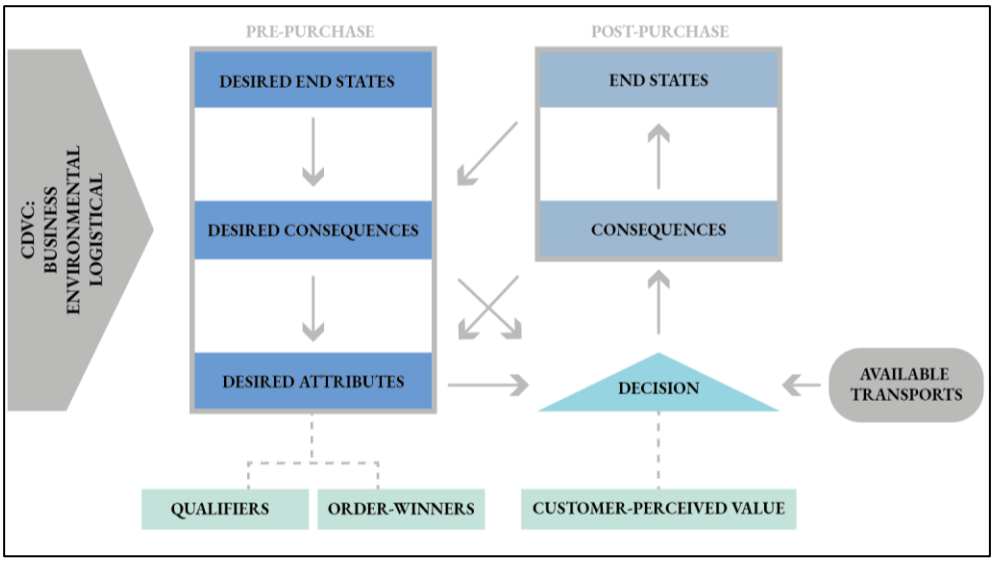

Figure 6: The proposed conceptual model

In Figure 6, the proposed model is presented that to some extent is a revised and developed version of Lammgård's original model. It explains the process of a shipper choosing transporter by combining the theories discussed in this chapter. Compared to the original, more focus is put on the buyer's perspective by deepening the theory of customer value with the customer value hierarchy and incorporating qualifiers and order-winners. The transport seller's role is not the focal point of the model but instead an input to the customer's transport choice. These adjustments were for the purpose of aligning the framework vis-à-vis the research questions of this thesis which focuses on the buying organization. Value now also includes the aspect of price, instead of regarding it as a separate factor.

The customer's goal when heading into the purchase is to achieve the desired end states. This is in turn converted to first desired consequences, and

subsequently desired attributes. The attributes are then divided into qualifiers and order-winners for increased clarity. When making a decision, the customer wants (according to Lammgård (2007)) to maximize the customer value – a function which depends on the desired consequences and attributes. This is subjective (different for each customer) and referred to as the customer-perceived value. All the available transports (purchasing options) are evaluated. Afterward, the purchased transport will lead to consequences for the customer. These are compared to the desired consequences, and the customer's desired attributes in the future might change from the new experience. The consequences might also make the customer to reach new end states. This is also applicable to experience, and the customer might have learnt about how consequences impact the end states – something which can result in new desired consequences for the customer.

The CDVC theory also implies that the value hierarchy is affected by other factors in addition to the learning process. Lammgård's theoretical model establishes the three contexts business, environmental, and logistical to be relevant.

In summary, the proposed model is a development of Lammgård's original model established in *Environmental Perspectives on Marketing of Freight Transports* (2007). The focus is the customer – the stakeholder which makes the decision of choosing transport provider. The model describes the origin of purchasing criteria and how it is influenced, central for the thesis' purpose and research questions.

4 Methodology

This chapter starts with describing the thesis' research strategy and research design. That is followed by a detailed explanation of the work process. This includes the literature review, empirical data collection, and how the analysis was done. Afterward, a discussion of an alternative approach for data collection is provided. The chapter ends with examining the thesis' validity and reliability.

4.1 Research strategy

This study has a qualitative approach. A qualitative strategy generally focuses on words rather than quantification (i.e., a quantitative strategy, which together with qualitative make up the two main research strategies) (Bryman & Bell, 2017). There are three main traits that should be mentioned about the qualitative strategy: (1) in regard to theory it is inductive, which means the strategy is to generate theories with help of empirical data; (2) (primarily) aligned with interpretivism, which means emphasizing the subjective interpretation and how individuals interact with the social realm; (3) constructionism as ontological orientation, which means that the social reality is viewed as constantly evolving and depends on the individual's creative and constructive ability.

Considering the purpose of this master's thesis and the research questions, the explorative nature resulted in the choice of a qualitative approach.

4.2 Research design

The research design constitute the framework for the collection and analysis of data (Bryman & Bell, 2017). The choice of research design represents the prioritization of different aspects of the research process. Bryman and Bell mention four common research designs for business research:

- Cross-sectional design
- Longitudinal design
- Case study
- Comparative design

The design of this study could best be described as a comparative one. It shares many similarities with a case study, but with the key difference of looking at multiple cases instead of a single one (Bryman & Bell, 2017). The comparative design allows for analyzing every individual case with the added opportunity of comparison.

Another decision to make is on what level the analysis is done, from the individual level to the societal (Bryman & Bell, 2017). Given the purpose of the thesis the conclusion was to base the analysis of an organizational level.

4.3 The work process

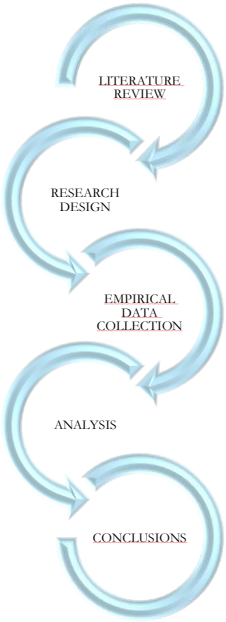

Figure 7: Overview of the work process

Figure 7 shows the work process which was followed. The literature review[1] was based on a mix of primarily peer-reviewed articles and to a limited extent books. For finding relevant literature for the subject matter of the master's thesis, the two search engines Google Scholar and LUBsearch (tool for students at Lund University) were used. The primary keywords used in Scholar and LUBsearch were: "emission data", "marketing", "transport industry", "purchasing", "qualifiers", "order-winners", "drivers", "barriers". The books that were used were discovered during searches online and borrowed from libraries at Lund University. For finding general facts related to the transport industry etc., Google was used.

[1] Considered to be secondary data

Initial research discovered several related publications from researchers at Gothenburg University and Chalmers Institute of Technology. The publications in question were published during a range from 2005 till today. Lammgård (2007) had conducted a doctoral thesis of environmental factors in purchasing of freight transport. Lammgård's (2007) theoretical framework and model were later utilized and developed for the purpose of this thesis; combined with the rest of the literature review this resulted in the forming of the thesis' theoretical framework.

The empirical data was collected by doing semi-structured interviews (see appendices A and B for interview guides). The level of specialization is high in the transport industry; in other words, trucks are purposefully built for different tasks (Sveriges åkeriföretag, n.d.). With demands and conditions varies across the country, this results in a highly heterogenous industry. As the purpose and research questions were aimed at the freight transport industry in Sweden, the objective was to cover the largest possible share of the industry given the constraints. The customer segments forest, food, and construction were identified by a mix of data review and expert questioning to be the largest buyers of road freight transport. Together they are estimated to make up over 50% of the freight transport industry (Sveriges åkeriföretag, n.d.). Interviews were subsequently set up with companies in the three largest customer segments; this would contribute to the research covering a larger share of all the transport purchases (compared to picking three small customer segments) and simultaneously reflect a good spread of customers.

There were two supplementary selection criteria. First, the companies had to be buyers of freight transport. Second, the intention was to collect data from a relatively large part of the segments (in share of purchases) while also considering reliability; to fulfil this, only larger companies were considered. Due to limited time additional interviews were not feasible.

Furthermore, two interviews were conducted with sellers of freight transport (large shippers). This was decided to get an additional perspective of the customers (who were the focus) from a different market role.

Two interview guides were prepared before the interviews, one to use for interviewing buyers and one for sellers (see appendices A and B). No predetermined criteria were given in the interviews, but instead broad questions were asked. This allowed the interviewee to speak freely of what they thought were important. The questions were discussed with the supervisor at LTH. In addition, the guide for buyers was also thoroughly evaluated during the first two interviews. While the focus of which questions that were prioritized shifted slightly during the interview process (for example less focus on the purchasing process and more on criteria), no significant changes were made to the interview guides.

The sample method of the interviewees was a mix of purposive sampling and convenience sampling (Bryman & Bell, 2017). The individual interview candidates were primarily found through referrals. By first reaching out to trade associations for each customer segment, assistance was received in identifying and contacting potential prospects in companies based on earlier described sample criteria. This approach was chosen by experience to achieve a better response rate. The interviewees were required to either take part in or have good insight into the purchasing (respectively selling) of the company's freight transport. This was mentioned to the referrals. For transport buyers, specifically logistic managers were requested as earlier studies had indicated them as being central (Styhre & Andersson, 2020). Environmental managers were interviewed for the transport operators due to having insights to the environmental perspectives in their sales process. In the end, this resulted in the majority being logistic managers, and the others a mix of managers; transport operators; and environmental managers.

In total 20 requests for interviews were emailed out directly to the interviewees. This resulted in 12 interviews conducted over a time span of three weeks, a conversion ratio of 60%. The interviews were between 30-50 minutes long, averaging 45 minutes. The interviews were booked in order of response time and at most two reminders were sent asking for participation. Interviews were booked in continuously also after the first interview had been done. This due to varying time of initial reach out and response speed. In total 13 interviews were in total booked in, but one was cancelled due to no-show. No replacement was considered necessary. In the end, of the interviews, five were with buyers in the forest industry; three with buyers in the construction industry; two with buyers in the food industry; and finally, two interviews with sellers. The first two interviews that were also done for evaluating the interview guide were conducted with forest companies, partly explaining the larger sample size. The role of each interviewee is included in Table 4.

Table 4: The company role of each interviewee

Company	**Role of interviewee**
Forest company 1	Forest Manager
Forest company 2	Logistics Manager
Forest company 3	Logistics & Environmental Manager
Forest company 4	Logistics Manager
Forest company 5	(1) Head of Logistics (2) Logistics Manager
Food Company 1	Logistics Director
Food Company 2	Logistics Manager
Construction company 1	Category Manager
Construction company 2	Quality and Environmental Manager
Construction company 3	Category Manager
Transport operator 1	Environmental Lead
Transport operator 2	Quality and Environmental Manager

All the interviews were conducted online (Google Meets or Microsoft Teams) with both authors participating. Notes were taken by one of the authors during the interview, and in all cases but one, the interviews were also recorded (by phone) to allow for later transcription. All the interviewees were in the beginning asked for permission to be recorded. If some of the answers afterward were deemed ambiguous, or some information missing, either during the transcription or result summarization, follow-up emails were sent out.

The interviews were dissected on-by-one and all information not related to the thesis' research questions was filtered out. All the interviews were then grouped (into forest/food/construction). After, the relevant information in each group

was divided to the corresponding research question. Tables were also used for improved discernability.

4.4 Alternative data collection method

A potential alternative data collection method which was considered was the use of a survey. Similar existing research have been done by either surveys (most common), interviews, or a mix. Surveys would have had certain benefits, noteworthy:

- Larger sample size
- Wider industry coverage

However, certain disadvantages were also identified:

- Difficult to include open-ended questions
- Limited ability to explain and discuss exploratory questions
- Low flexibility to tailor questions for the individual interviewee

This is in line to what Bryman and Bell mention when comparing the different methods (Bryman & Bell, 2017). Based on this analysis it was ultimately settled to do interviews – mainly due to expected communication issues when discussing emission data.

4.5 Reliability

A study is reliable if it can be replicated with the same results (Bryman & Bell, 2017). This is the opposite of a study that is affected by chance or coincidences. Bryman & Bell (2017) believe this is mostly relevant to consider for quantitative studies; however, it can be adapted for use in a qualitative scenario. Reliability can then be separated into internal and external reliability.

- Internal reliability means that the researchers (when multiple) have agreed on how to interpret what they see and hear.
- External reliability covers the topic of to what extent the study can be replicated. Often difficult for qualitative studies as the social environment is always changing.

To increase the internal reliability both researchers were present at all the interviews. Notes were first taken actively during the interview, followed by a discussion right after the interview ended. The interview was then transcribed by one of the researchers, followed by an additional discussion to summarize. Overall, few disagreements occurred. However, when so was the case, the approach was to first discuss internally and if necessary, clarifying questions to the interviewee were sent.

Regarding the external reliability of this thesis, it is worth noting the evolution that is happening in environmental consideration and work. Indeed, it is possible or perhaps even likely that the findings would be different if the study was to be replicated after some time has passed. Further, semi-structured interviews were used with rather broad questions. This increases the difficulties in replicating the study as the interviews would progress differently if redone, and the interviewee might answer slightly differently depending on the previous questions and answers. However, this approach seemed favourable to support the explorative purpose and reduce the interviewers' influence on the interviewee.

4.6 Validity

Validity refers to whether the implications of a study are coherent (Bryman & Bell, 2017). There are four different kinds of validity most often being considered: ecological, measurement, internal, and external validity. For a qualitative study, the two latter are of highest relevance. Here they are described slightly adjusted for the qualitative scenario:

- Internal validity implies a good conformity between the observations and the theoretical ideas that are developed.
- External validity considers how well the results can be generalized outside of the study environment. Unfortunately, this can often be limited when case studies are used, and the sampling size is smaller.

To build the internal validity, external support was utilized. The thesis' supervisor at LTH took part in overseeing the development of the theoretical framework, interview guide, and empirical data gathering.

For external validity, the sampling approach was the primary tool. To best reflect the whole road freight transport industry (which was the purpose), the thesis' included the largest possible share of the market which was feasible.[2] This while striving for generalizability for each individual segment, which was done by conducting as many interviews as time constraints allowed.

[2] See 4.3 for further details

5 Setting the context

This chapter clarifies certain concepts which are relevant to understand the context of the thesis and interpret the research results. Several of them were mentioned by the company representatives during the interviews or otherwise reoccurring in the research field. They are all related to the road transport industry or green marketing. The concepts are (in order): sustainability reporting; standards for calculation and reporting of emissions; carbon footprint labels; greenwashing; the greenhouse gas reduction mandate.

5.1 Sustainability reporting

EU have implemented some regulations of importance to the research. Two examples are NFRD (Non-Financial Reporting Directive), adopted in 2014, and the upcoming CSRD (Corporate Sustainability Reporting Directive), planned to be adopted in 2022 (Directive 2014/95/EU of the European Parliament and of the Council, 2014; European Commission, n.d.-a). NFRD requires certain firms to release sustainability reports, one part covering environmental protection (Finansinspektionen, 2022).

In Sweden, NFRD is implemented in årsredovisningslagen (ÅRL) (the Swedish law covering annual reports) (Finansinspektionen, 2022). The law has required sustainability reports for certain companies since 2017. While the requested content is similar to NFRD, the extent to which companies got to report is wider. The upcoming CSRD will enforce more companies to present Sustainability reports, however, this effect will be limited in Sweden because of the already higher requirements (European Commission, n.d.-a; Westman, n.d.). Nevertheless, CSRD will also (in combination with other things) set stricter and common standards for the reporting (European Commission, n.d.-a).

The EU directives are aimed at encouraging companies to "develop a responsible approach to business" and help investors, civil society organizations,

consumers, policy makers and other stakeholders to evaluate non-financial performance not necessarily found in the traditional annual reports (European Commission, n.d.-a).

5.2 Standards for calculation and reporting of GHG emissions

There are several different standards today for calculating GHG emissions from transports. Examples are the European standard EN 16258 (from 2012), the GLEC Framework (from the organization Global Logistics Emissions Council in 2016) and EcoTransIT (Wild, 2021).

Unfortunately, the co-existence of multiple standards also creates some issues. The European Commission started the initiative CountEmissions EU in 2021 (European Commission, n.d.-b). According to the initiative takers, there is an "information failure" which creates problems for companies when trying to monitor and compare different transport services. Consequently, companies can come to make incorrect choices of transport alternative. The information failure derives from the following two issues:

- Fragmentation of methodological approaches for GHG emissions calculation and sharing in transport and logistics. This creates problems in comparison different transport alternatives.
- Limited uptake of emissions accounting in everyday business practice. I.e., even though there is a growing interest about using GHG emissions as sales argument and in decision-making, there can be a lack of necessary data to accommodate this.

The aim of CountEmissions EU is to create a common framework for calculating and reporting emissions, including freight transport.

More specifically, the objectives are:

1. providing **a single EU framework for calculating GHG emissions data** of transport operations/services in freight and passenger sectors;
2. making **available reliable and comparable information** on the GHG intensity of individual transport services; and
3. facilitating the **uptake of GHG emissions accounting** in business practice.

In accordance with the EU treaty, the results can be enforced on the member states. However, as of this day it is still work-in-progress. The initiative is still in its development phase with a preliminary deadline set to Q4 2022.

The European standard EN 16258 which was published in 2012 and today is the most internationally accepted (SIS, 2012; Wild, 2021) sets a methodology for calculation and reporting of greenhouse gas emissions (i.e., carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) and energy consumption in the transport sector (SIS, 2012). The aim of the standard was to be applicable and usable for a diverse target group (all transport modes being included), while still maintaining accuracy and scientific rigorousness. Countries in Europe were subsequently bound to adapt the standard in accordance with existing regulations in relation to the European Committee of Standardization (CEN). However, the use of the standard is in general voluntary for the individual organization.

Several points of criticism are aimed at the EN 16258 in a publication from 2013 (Ehrler & Seidel, 2014). First, EN 16258 regularly uses the term "vehicle operation system" ("VOS") for vehicle operations, a central part of the calculation. Unfortunately, there is a lack of explanation and clarification, and consequently the term brings a lot of leeway. The standard also excludes some sources of emissions, for example freight handling and the vehicle lifecycle. The

inclusion of subcontractors is also a challenge as external data often is inaccurate or missing.

5.3 Carbon footprint labels

What could be argued to be a similar concept to emission data as a purchasing criterion is the use of carbon footprint labels. One example is The Carbon Trust; a global organization founded by the British government in the early 2000s. They currently offer to certify carbon footprint labels for both the business-to-business and business-to-consumer markets (Carbon Trust, n.d.). The labels include information about the carbon impact of the product, of which transport is a part of the calculations.

Groening et al. (2014) investigated this emerging field, looking at potential impact and informational content. One speculation was that while outperforming the industry average in terms of emissions was likely preferable, further emissions reductions could have diminishing returns later. Still, falling behind the industry average could result in negative financial consequences. The carbon footprint label also must account for the entire life cycle.

5.4 Greenwashing

Awareness of the issue of *greenwashing* is prudent when discussing environmental arguments in marketing, as it potentially could hurt customer trust and the progress towards sustainability (Winston, 2010). The environmentalist Jay Westerveld came up with the term greenwashing in 1986 to criticize hotels' claims of environmental work when requesting guests to reuse towels (Becker-Olsen & Potucek, 2013). Kalesnik et al. (2020) concluded when examining companies' GHG reporting that the potential for greenwashing today is high. Suggestions for solutions would be to establish a single standard (e.g., the GHG Protocol) and introduction of mandatory auditing. In EU, there are currently

processes going on in relation to the legislative side of greenwashing (European Commission, n.d.-c).

5.5 The greenhouse gas reduction mandate

From July 1st, 2018, fuel suppliers in Sweden have a greenhouse gas reduction mandate (Energimyndigheten, 2020). This means they must (by law) reduce emissions from diesel (and gasoline) by a certain percentage every year. To achieve this the diesel and gasoline is mixed with renewable fuel (and to some extent produced with more efficient production) (Holmström, 2022). To calculate if the reduction mandate is being achieved, the supplier must compare climate impact of the fuel in question with a corresponding fully fossil one (Statens energimyndighet, n.d.). A lifecycle perspective is used, looking from production to usage. It is g CO_2e / MJ which is compared.

The greenhouse gas reduction mandate leads to higher fuel prices as renewable fuels are more expensive than fossil ones (Holmström, 2022). This can according to the industry organization Sveriges Åkeriföretag be problematic for both the transporters and society as a whole (Lundsgård, 2022). Overall, the margins for the businesses are low. Higher demands for biofuel, connected to the yearly increasing reduction mandate, in combination with lower than necessary production, drives up the price. Not all transporters have clauses in the contracts to push increased fuel prices on to the customer but must cover it themselves. This can result in unprofitability and ultimately bankruptcy. In 2019, on average the cost of diesel during a typical month could range between 10-35 % of total costs for the companies depending on use case (Sveriges åkeriföretag, n.d.).

Sweden has adopted European emission standards (Miljöfordon.se, 2020). Euro VI is the latest standard, a requirement to be met for new heavy trucks. It

regulates the maximum allowed emissions for a range of toxic gases (e.g., CO, HC, and NOx) (Ecopoint, n.d.).

In this chapter, subjects have been discussed to acquire contextual knowledge about the road freight transport industry, green marketing, and GHG emissions. In the next chapter, the results of the interviews will be presented.

6 Results

In this chapter the results from the interviews with Swedish shippers in the forest, food, and construction industry along with large transport operators are presented. First, findings are presented based on the research questions and subcategorized by the industry of the shippers. Second, the findings from the interviews with the transport sellers are presented.

6.1 Companies interviewed

The interviewed companies will be referred to as: Forest Company 1, 2, 3, 4, 5; Food Company 1, 2; Construction Company 1, 2, 3; and Transport Operator 1, 2.

6.2 Environmental factors considered for shippers

6.2.1 The forest industry

Overall, all interviewed companies in the forest industry stressed environmental aspects in their purchasing process. Several common denominators between the companies were identified, but differences were also apparent. Table 5 presents an overview of the environmental aspects in the purchasing process for Forest Company 1 to 5.

Table 5: Overview of the environmental aspects for Forest Companies

Environmental factors	**Forest Company 1**	**Forest Company 2**	**Forest Company 3**	**Forest Company 4**	**Forest Company 5**
Age of vehicle	✓	✓	✓	✓	✓
Type of engine	✓	✓			
Type of fuel	✓	✓	✓	✓	
Euro Class		✓	✓	✓	✓
Distance driven with empty loads	✓				
Sustainability criteria for road transport by the Swedish Forest Industries Federation		✓	✓		
Electrification			✓		
ISO 14001					✓
ISO 50001					✓

Almost all interviewed companies in the forest industry talked about *Euro Class* (Euro 5 and 6) as a criterion in their purchasing process. Only Forest Company 1 did not mention it. However, Forest Company 1 brought up that the *age of the vehicle* as well as the *type of engine* were of importance. This can indicate that *Euro Class* is also a part of their purchasing criteria. All interviewed companies also highlighted that *age of the vehicles* in the fleet is of note. Regarding the *type of engine,* it was a criterion that specifically Forest Company 1 and Forest Company 2 underscored in the interviews.

> *If two transport operations can drive the distances we require, and one costs 10% more, but the other one is more environmentally friendly and fits in better with our policy, then we will probably choose the one with 10% higher costs. Euro Class is our primary method of determining which one is more environmentally friendly* – Forest Company 4 (translated)

Type of fuel was mentioned by four out of five forest companies as a factor. Forest Company 1 specifically detailed that they are looking at biofuels. Forest Company 2 pointed out that they are working to a large extent with HVO, and consider it being worth paying extra to get trucks driving on HVO. Forest Company 3 said that they are looking at fuel as a criterion and they believe that what fuel their transports are driven on impacts their image. They also emphasized that the *type of fuel* is the most important criterion they are looking at related to the environment/climate. Forest Company 4 has a goal as a corporate group to become fossil-free by 2030 and therefore believes it is important for credibility. The internal ambition is to lead the way in the industry regarding a climate focus with the fuel type. They specifically mentioned bioenergy as important and that transport operators driving with HVO or on bioenergy can be chosen for this reason.

Forest Company 5 was the only forest company that did not directly highlight the *type of fuel*. However, they acknowledged that they find it challenging to make specific demands in the environmental works of transport operators. They have the overarching requirement that some focus and work regarding the environment should be in place for the potential carrier selected. However, they believe all transport operators have different foundations to stand on, making it difficult to have general demands that apply to all transport sellers.

Forest Company 1 pointed out that the *share of transports being driven empty* is a factor considered. Forest Company 2 also mentioned this, however, in the sense

of evaluating existing partnerships rather than something which is considered when negotiating with new transport operators.

Forest Company 3 mentioned *electrification* as a purchasing criterion when looking at shorter and regional transports. They want to be a leader rather than a follower in the electrification of regional transports and have been in discussions with car manufacturers to be in the frontline in this regard.

ISO-certifications as criteria in the purchasing process was only pointed out by Forest Company 5 as something they were targeting. They mentioned that *ISO 14001* and *ISO 50001* as certifications they are requiring of their transport operators.

Lastly, during the interviews it was occasionally touched upon that the *Swedish Forest Industries Federation requirements on road transports* is a part of the purchasing process. Forest Company 2 and 3 voiced that they send the document *"Sustainability criteria for road transport"* as a part of the contract writing with new transport sellers. The document highlights several criteria touching upon environmental aspects (Skogsindustrierna, 2022). Below, some criteria from the mentioned document are highlighted:

- *Has an explicit environmental policy*
- *Shall educate drivers in fuel-saving driving practices*
- *Operate towards reduced fuel consumption in liters per tonne-km*
- *Contribute to transport arrangements that have a lower impact on the environment, e.g., combined transport or less idling of engines*
- *Shall take joint action with the client to ensure that the vehicles are suitable for their transport contracts in terms of environmental and transport efficiency*
- *Euro 5 standard or above for all vehicles in the regular fleet*
- *When purchasing new vehicles for a particular contract these should be of Euro 6 standard or above*
- *New vehicles should be equipped with a technical support system to monitor fuel consumption at the driver's level*
- *Vehicles shall be serviced in a way that minimize the impact on the environment*

6.2.2 The food industry

Both the interviewed companies in the food industry highlighted that environmental aspects are of importance in their purchasing processes. Table 6 presents an overview of the environmental aspects in the purchasing process for Food Company 1 and 2.

Table 6: Overview of the environmental aspects for Food Companies

Environmental factors	**Food Company 1**	**Food Company 2**
Age of vehicle	✓	✓
Type of engine	✓	
Type of fuel	✓	✓
Euro Class	✓	✓
Electrification	✓	✓

First, *Euro Class* was accentuated as a basic requirement in the purchasing processes by Food Company 1 and 2. Food Company 2 highlighted more details around *Euro Class* and mentioned that more than 80% of the fleet needs to be Euro 6.

Both companies also stated that *type of fuel* and *age of vehicle* played a role in the purchasing process. Food Company 1 had a strategy to move towards liquid or compressed biogas. They highlighted that if they have two operators, of who one is focusing on biogas and the other one is focusing on RME/HVO, the company would be inclined to pick the transport seller which focus on biogas. However, RME/HVO has been part of their old strategy, meaning that some of their current transport sellers are focused on this. Food Company 2 said that they mostly focus on trying to get transports via rail as a part of their environmental strategy, but when they use road transport, *type of fuel* is considered. However, for Food Company 2, it was said that there are no outspoken/specific requirements regarding the *type of fuel*, it is rather considered as the wider company strategy is to become fossil-free within the next ten years.

Food Company 1 and 2 raised *electrification* as a criterion. Food Company 1 specifically highlighted that *electrification* (alongside biogas) is of high importance for their strategy for road transports. Food Company 2 pointed out that they have made efforts in urban environments regarding *electrification* and specifically looks at it when evaluating environmental efforts in their purchasing process. Food Company 2 stated in the interview that they are striving to always work towards fossil-freeness in their road transports.

6.2.3 The construction industry

Findings in the construction industry varied from company to company but overall, there are not many direct specified criteria. Table 7 presents an overview of the specified environmental aspects in the purchasing process for Construction Company 1,2,3. Worth noting is that all questions answered by Construction Company 1 were in regard to road transports for their business unit infrastructure, for the other divisions they were not decision-makers.

Table 7: Overview of the environmental aspects for Construction Companies

Environmental factors	**Construction Company 1**	**Construction Company 2**	**Construction Company 3**
Age of vehicle	✓		
Type of fuel	✓		✓
Euro Class	✓		
Distance driven with empty load	✓		

Overall, the interviewed companies in the construction industry do not have many clear outspoken criteria regarding environmental aspects in their purchasing processes. Construction Company 2 currently do not have any purchasing criteria with regards to environmental aspects for their road

transports. Instead, every construction project is in charge of optimizing the transports for that specific project. They revealed that some projects have fossil-free transports whereas others do not. It is essentially the customer ordering the construction/project that pushes whether there should be any considerations of environmental aspects or not. However, the company wants to put guidelines in place and decide more general purchasing criteria in regard to the environment. Construction Company 2 commented that the reason for currently not having factors in place is that they find it difficult to find good criteria to use in order to assess environmental performance.

Euro Class, which was largely represented in the forest and food industry was only highlighted by Construction Company 1 as a factor. Furthermore, Construction Company 1 also brought up that *engine types* and *age of the vehicles* are taken into consideration when deciding which transport operator to choose. Worth acknowledging is that the criterion of *Euro Class* was emphasized on several occasions which shows the importance of this criterion for Construction Company 1.

Distance driven with empty loads was also mentioned by Construction Company 1 as a criterion. The interviewed manager highlighted that the logistics part is important, how the carriers plan their routes and making sure that they are not driving with empty loads for longer than necessary.

The *type of fuel* was acknowledged by both Construction Company 1 and 3. Construction Company 1 cited that regarding the *type of fuel* they are in most cases concerned about the customer demand regarding the transport for the specific construction project. Construction Company 3 said that they regard the *type of fuel*. Customers are also the main driver here where many customers demand 100% fossil-free road transports. Moreover, the interviewee highlighted the issue of having many types of customers but limited transport operators to choose

from, meaning that the purchasing process becomes complicated because all customers demand a different degree of environmental consideration. However, the company has an internal criterion regarding share of biofuel. Nonetheless, it is currently being updated, meaning that it is always considered even if the customer does not have any demands at all regarding environmental impact.

6.3 Qualifiers and order-winners

The mentioned criteria specified in the sections above were then categorized into order qualifiers or winners for the companies in order to answer research question 2. For each industry, the companies will be highlighted one by one to share the insights for each firm regarding their thoughts on qualifiers and winners.

6.3.1 Forest Industry

Overview

In Table 8 the results from the interviews regarding order qualifiers/winners are highlighted.

Table 8: Qualifiers and order-winners for the Forest Companies

Environmental factors	**Forest Company 1**	**Forest Company 2**	**Forest Company 3**	**Forest Company 4**	**Forest Company 5**
Age of vehicle	Qualifier	Qualifier	Qualifier	Winner	Winner
Type of engine	Qualifier	Qualifier			
Type of fuel	Qualifier	Winner	Winner	Winner	
Euro Class		Qualifier	Qualifier	Winner	Winner
Distance driven with empty loads	Qualifier				
Sustainability criteria for road transport by the Swedish Forest Industries Federation		Qualifier	Qualifier		
Electrification			Winner		
ISO 14001					Qualifier
ISO 50001					Qualifier

Forest Company 1

Forest Company 1 commented that all the environmental aspects they look at are considered to be qualifiers. They noted that the reason for this is that the road transport industry, according to Forest Company 1, is not sufficiently developed so that transport operators can show different levels of environmental sustainability, it is more about meeting the requirements.

Furthermore, they also consider environmental aspects as basic requirements because they do not have to make higher demands than their customers require.

Forest Company 2

Forest Company 2 consider *Euro Class* as an order qualifier and mentioning it is a basic requirement they look at. However, they commented that they can see themselves pay extra for a transport operator that drives on e.g., HVO, indicating that it is an order-winner. Regarding *type of engine,* it is considered as a basic aspect and is an order qualifier. The *sustainability criteria for road transport by the Swedish Forest Industries Federation* is considered a requirement when signing a new contract, indicating that it is an order qualifier.

Forest Company 3

Forest company 3 cited that the *sustainability criteria for road transport by the Swedish Forest Industries Federation* is a requirement suggesting that it is an order qualifier. However, the *type of fuel* can be considered an order-winner since the interviewee brought up that even when there is a slight difference in price, the environmental aspects such as *type of fuel* can be a deciding factor. *Electrification* is considered as a bonus and an area they want to be involved in and lead the way signalling that it can be classified as an order-winner. Nothing specific was mentioned regarding *Euro Class* and *age of vehicle* (in terms of qualifier or winner) but it can be considered requirements since they are also part of the sustainability criteria by the Swedish Forest Association (which is classified as an order qualifier).

Forest Company 4

Regarding the environmental aspects Forest Company 4 said in the interview that *Euro Class, age of the vehicle* and *type of fuel* are not considered as basic requirements but rather order-winners. The interviewee voiced *type of fuel, Euro Class* and *age* all go hand in hand. Because newer vehicles probably have a higher

class and then increases the probability of having a better fuel type from an environmental aspect.

Forest Company 5

Forest Company 5 specified that *ISO 14001* and *ISO 50001* are basic requirements they look at indicating that they are order qualifiers.

Regarding *Euro Class* and *age of vehicle* the firm stated that if they are weighing between transport operators in a strategic partnership where the agreement runs over several years, then these two criteria can be considered as order-winners.

6.3.2 Food Industry

Overview

Table 9 shows the findings from the interviews regarding order qualifiers/winners.

Table 9: Qualifiers and order-winners for the Food Companies

Environmental factors	**Food Company 1**	**Food Company 2**
Age of vehicle	Qualifier	Qualifier
Type of engine	Qualifier	
Type of fuel	Winner	Winner
Euro Class	Qualifier	Qualifier
Electrification	Winner	Winner

Food Company 1

Food Company 1 highlighted in the interview that broadly speaking the environmental aspects they look at are viewed as basic requirements which need to be fulfilled. This indicates that they are qualifiers. However, there is an

exception from this, namely the criteria *type of fuel*. As mentioned earlier, Food Company 1 strives to move towards liquid or compressed biogas. Thus, they are inclined to pick a carrier which focus on this. Electrification is also an example of a criterion used as an order-winner by Food Company 1, which is also an important part of their path ahead within their environmental strategy.

Overall, Food Company 1 also expressed that transport operators which aim to drive environmental work forward and be a leader (rather than a follower) from an environmental perspective can get an advantage when being considered as carrier.

Food Company 2

Food Company 2 clearly underlined that *Euro Class* and *age of the vehicle* are qualifiers for them. Specifically, it was underscored that 80% of the fleet needs to be Euro 6. Food Company 2 further expressed that this, however, is the only strict requirement in regard to environmental aspects which they have specified. *Electrification* and *type of fuel* can be considered as order-winners. Forest Company 2 for instance said that it can cost a bit extra to get a fuel type with less emissions – within reasonable limits.

6.3.3 Construction Industry

Overview

Table 10 displays the results from the interviews regarding order qualifiers/winners for the construction industry.

Table 10: Qualifiers and order-winners for the Construction Companies

Environmental factors	**Construction Company 1**	**Construction Company 2**	**Construction Company 3**
Age of vehicle	Qualifier		
Type of fuel	Qualifier		Qualifier
Euro Class	Qualifier		
Distance driven with empty load	Qualifier		

Construction Company 1

Construction Company 1 highlighted that all environmental aspects they look at are basic requirements that can be considered as order qualifiers.

Construction Company 2

Construction Company 2 does not have any aspects regarding the environment.

Construction Company 3

Construction Company 3 communicated that price is their only order-winner criteria, indicating that their environmental aspect, *type of fuel*, can be considered an order qualifier.

6.4 Enablers, drivers, and barriers

6.4.1 Forest Industry

Enablers

Several enablers came through during the interviews with the forest companies. Forest Company 1 for instance mentioned the enabler of transport sellers are becoming increasingly active and aware about the environmental sustainability topic. A future enabler that was highlighted by Forest Company 1 and 2 is that the calculation of emission data needs to be more standardized to make sure transport operators are calculating it in the same way, to be able to make an apples-to-apples comparison.

Forest Company 3 said that there are advanced companies that have several different services for truck transports. For instance, geofencing and the possibility to collect precise emission data and fuel consumption from the truck system – and make it available for transport buyers. Furthermore, Forest Company 3 mentioned that more resources are put towards CO2-reduction which could be a driver and enabler for using emission data as a criterion.

Drivers

Underlying forces and drivers for using emission data as a purchasing criterion were discussed during the interviews. Forest Company 1 expressed that customers are a driver and that they only need to put as high requirements as their customers do. Forest Company 3 also stated customers, i.e., it happens that they get inquiries from customers about what their climate footprint is, estimates that they wanted from the company. Forest Company 2 also mentioned customers as an important driver.

Forest Company 1 also pointed out that the internal management and the central sustainability team, something Forest Company 3 and 4 also accentuated.

Forest Company 2 revealed that a driver could be the importance it has for their own marketing, showing that they are sustainable.

Barriers

Several barriers were communicated during the interviews with the forest companies. Forest Company 1 expressed that the road transport industry is not very developed yet, thus it is difficult to be able to measure or show different levels of environmental awareness. Furthermore, Forest Company 1 mentioned that they do not need to put stricter requirements than their customers do, and currently they do not put emphasis on emission data.

Forest Company 2 said that they see emission data more as useful for accounting purposes today, and that the calculation of emission data needs to be standardized in order to be considered as a criterion.

Forest Company 3 underlined that a barrier is that there is not a significant difference in emissions from different transport operators. Furthermore, it was mentioned that it is difficult to verify the emission data making it difficult to have it as a criterion. However, Forest Company 3 believes that there are companies out there that could produce precise data which could make it useful.

6.4.2 Food Industry

Enablers

No enablers were identified during the interviews.

Drivers

Food Company 1 highlighted that the internal sustainability team, and top management are driving the process to fossil-freeness. Furthermore, they mentioned that their customers show a high level of awareness. In negotiation

with some firms in private label procurements, the environmental sustainability topic is common.

Food Company 2 also underscored that an internal drive from top management to become fossil free in their transports. Additionally, it was mentioned in the interview that new companies with a high sustainability focus is driving sustainability work, which could be considered as a driver to put more focus on emission data.

Barriers

Food Company 1 mentioned that a barrier for them to use emission data in the purchasing process is that the company itself is in charge of the route planning. Therefore, the interviewee argues that the transport operator essentially only can try to focus on eco-driving as much as possible.

6.4.3 Construction Industry

Enablers

No enablers were identified during the interviews.

Drivers

Construction Company 1 communicated that the construction industry has been good at pushing new requirements in the purchasing process related to the environmental topic. They mentioned "*Byggföretagen*" (The Swedish Construction Federation) as an example of an industry- and employer organization helping to move the work forward. Furthermore, Construction Company 1 highlighted customers as a driver; in addition to the internal management that wants to fulfil the organizations corporate environmental goals. On the other hand, Construction Company 2 said that the customer is the only main driver for the environmental work, not the internal management. Construction Company 3 expressed that it is mostly their customers from the private sector that helps to

drive the work forward within environmental sustainability by trying to develop new systems and technologies. Construction Company 3 also mentioned that a lot of customers require zero CO_2-emissions from the transports – which could be a driver for the firm to look at emissions as a purchasing criterion when buying transport services.

Barriers

Construction Company 1 voiced an issue with using emission data as a potential purchasing criterion, namely that today that it is not fully standardized. The interviewee said that it must be competition-neutral way of calculating it and that there most likely must be an authority that decides how this is standardized. Today, it is not really given what parameters to calculate with.

6.4.4 Transport Operators

In the previous section the results from the interviews with the transport buyers were presented. In this section the findings from the interviews with the transport sellers is presented regarding the drivers, enablers, and barriers of using emission data as a purchasing criterion.

Enablers

No enablers were identified during the interviews.

Drivers

According to Transport Operator 2, a driver for emission data is an increased demand from customers which are using it in their sustainability reporting – a trend believed to continue for many years ahead. The environmental focus is increasing rapidly and with this more data of that category is of interest. This is also supported by Transport Operator 1.

Barriers

While the significance of environmental factors is increasing according to both interviewees, Transport Operator 1 still maintained that many SMEs still show a clear lack of interest. This was especially applicable for more remote locations. Furthermore, both companies push that the absence of a single standardized method for the calculations of GHG-emissions (with readily available data to use), results in a lack of accurate and comparable information for the transport buyers. The currently widespread use of estimated emission data was criticized for being inadequate for the purpose of making proper decisions based on emissions. Both companies described their own efforts in delivering high-quality data (seeing themselves as forerunners), but also further emphasized the many difficulties for transport sellers. Transport Operator 2 mentioned the technical requirements, for example the need of measuring data in real-time and doing corresponding calculations when a single truck is delivering goods for multiple customers simultaneously. However, for standardized routes this would be easier. Transport Operator 2 also requested third-party reviews for emission data to be used in marketing, otherwise fearing a lack of actual benefits and greenwashing. In the end however, Transport Operator 2 said that a lot of the solutions required already exist, it is just the issue of putting it all together in what would be a complex system with many different data streams.

7 Discussion

This chapter discusses the findings in the results section, research question by research question. A constructive and critical discussion and validation of the thesis' proposed model is thereafter provided.

As presented in the introduction, the purpose of this thesis is to examine the purchasing of heavy road freight transports in Sweden, especially regarding climate related factors, and the research questions are formulated as follows:

4. What purchasing criteria are currently being used in the purchasing of heavy road freight transport that are related to climate impact in Sweden?
5. Are these criteria currently used as qualifiers or order-winners in Sweden?
6. What drivers, enablers and barriers do buyers and sellers recognize currently exist for the use of emission data as a purchasing criterion for heavy road freight transport in Sweden?

7.1 Identified purchasing criteria related to climate impact

While earlier research mainly has looked at the trade-off between major factors (price, environmental impact, delivery time, delivery precision), this thesis aimed to identify all individual purchasing criteria related to environmental impact. In total nine different criteria were discovered. Of these, *type of fuel, Euro class* and *age of vehicle* were the environmental aspects that shippers mentioned most frequently when discussing purchasing of heavy road freight transports in Sweden.

The research uncovered most criteria during discussions with the forest industry. However, no conclusions can be done regarding if a wider variety of purchasing criteria exist in certain segments. Indeed, more interviews were conducted with companies in that industry, increasing the likelihood for additional distinct

criteria. Looking at criteria per company, the construction industry mentioned fewest. Overall, all three companies had relatively little consideration of environmental factors when purchasing road transport.

Differences exist between purchasing criteria in different customer segments. For example, the forest companies share a policy not applied in other industries. This is perhaps not surprising, as earlier research also has showed environmental work to depend on numerous influential factors, some of which are partly industry shared (Lammgård, 2007). However, the limited sampling size should constrain drawing any major conclusions regarding this topic, and it was not the objective of the research.

None of the companies used direct emission data as an environmental criterion. This was not a significant surprise considering the context and what earlier research had concluded. Other factors are still of far higher importance for buyers when purchasing transport – combined with the current lack of clear guidelines for how it would work regarding calculation standards (European Commission, n.d.-b; Styhre & Andersson, 2020).

7.2 Environmental criteria as qualifiers and order-winners

The research showed that companies in the construction industry consider the environmental aspects as qualifiers. For companies in the food and forest industry, the environmental aspects are both qualifiers and order-winners.[3] Overall, there was no clear consensus – all criteria were present as both qualifiers and order-winners even within the same segment.

[3] It should be noted that a criterion being a winner doesn't necessarily mean it is of higher importance than if it was a qualifier, or that it is better for the environment. Ambitiously set qualifiers, for example requiring the transport operator to use only biofuel, should result in a decision at least as "good" as if biofuel was an order-winner.

For the order-winners, t*ype of fuel* was the most occurring criterion. Five companies in total responded they to some extent use it for that criterion. This was not expected considering that prior research only suggested a weak inclination to prioritize the environment at the cost of more traditional criteria like price and service quality (Lammgård, 2007; Lammgård & Andersson, 2014).

The research question was tailored to explore if environmental criteria are used as qualifiers or order-winners, it did not cover how it was then implemented. This implies that there can be a large variety between two companies even though they have a shared overall categorization. For example, if *type of fuel* is considered an order-winner by two companies, it is still a trade-off with other aspects – and that weighting can be vastly different depending on firm (and situation).

7.3 Drivers, enablers, and barriers of emission data

The study identified barriers, drivers, and enablers. In terms of barriers mentioned by the shippers, one prominent is emission data calculation not being standardized and verified by independent third parties. This came up both during the interviews with transport operators and shippers, meaning that the sell-side and the buy-side agree on this barrier.

Several drivers for using emission data as a purchasing criterion were identified. It seems on one hand be internally driven by environmental sustainability teams and top management. On the other hand, customers seem to push the environmental work forward. These are drivers that are also mentioned by Björklund (2011) who indicated that environmental management; management; reputation of the firm; company and product image; and customer's environmental demands are drivers for environmental factors in the purchasing process. However, reputation of the firm, company and product image are factors which were not apparent in this study. In this study, customers and their

demands were also identified as a barrier – in the cases where customers of the shippers do not drive sustainability forward. This finding is in line with Björklund's (2011) research which indicated that customers' non environmental demands can be seen as a barrier.

The transport operators mentioned sustainability reporting as a driver since shippers sometimes ask for the information for reporting purposes rather than deciding operator. This deviates from the main topics for drivers in the interviews with the shippers, meaning that the buy-side and sell-side seems to view this driver differently.

Björklund (2011) found that management is an important enabler for environmental considerations in purchasing. However, this was not apparent when diving deeper into the influential factors of using emission data as a purchasing criterion. Rather few enablers came up during the interviews. There are possible reasons to why few enablers came up. One could be that there currently are not many enablers for enabling emission data as a purchasing criterion. On the other hand, perhaps it was poorly communicated during the interviews, and the conversation was not steered enough into this topic. Another explanation could be that it was difficult for the interviewees to come up with enablers – without getting the chance to reflect beforehand.

7.4 Evaluation of theoretical model

The proposed model presented in Figure 6 describes the process of a shipper choosing transporter based on several theories. To validate whether this theoretical model holds any value in practice, it is of interest to evaluate the model. David Gray (2021) has published seven criteria which can be applied to accommodate this. Each criterion will first be explained and then applied on the model:

Comprehensiveness: Does it adequately cover the domain it seeks to explain? This can be accomplished either by being empirically comprehensive (encompassing what empirical data has shown) or logically comprehensive (complete by definition).

Utility: Is it about something important, and can it convey either something useful or interesting about this?

Validation: Is it validated by empirical and observable data?

Clarity: Is it familiar (easy to understand and use)? Can it be used to simplify complexity? Does it limit the number of explanatory factors to what is actually required?

Memorability: Is it memorable?

Integration: Is the model integrated logically in addition to consistent and coherent?

Differentiation: Does the model recombine familiar elements or propose something novel?

The criteria were applied on the model (Figure 6) and the belonging discussion can be read below in Table 11.

Table 11: Gray's (2021) evaluation criteria applied on the proposed model

Criteria	**Discussion**
Comprehensiveness	The model covers the most relevant aspects given the research questions. By increasing the focus on the customer, the model gets more tailored for the purpose than Lammgård's original. The model is aimed to be logically comprehensive, however, it is not validated to be so.
Utility	Yes.
Validation	No. The thesis proposed a theoretical model that would be challenging to empirically validate.
Clarity	The model's aim is primarily to explain a theoretical concept, not to be regularly applied. Nevertheless, it should be able to reduce complexity by limiting explanatory factors.
Memorability	Yes.
Integration	Yes. All the different theories and processes are interrelated with each other to create an integrated model.
Differentiation	The model is a development of Lammgård's original model with new theory.

Overall, the main caveat after evaluating is the lack of empirical evidence which supports the model. However, the authors believe this would be difficult to provide (especially in the context of a thesis) and that logical/theoretical proof is adequate for the purpose of this research. Future research will hopefully dissect and further validate the model as a third-party examiner. For now, no reason to adjust the model is identified.

8 Conclusions

This chapter raises the concluding remarks of this master's thesis. A summary of the thesis is included with the most important parts from results and discussion. After, research and managerial implications are highlighted. The final conclusions look at limitations and give suggestions for future research.

8.1 Summary

The purpose of the thesis was to examine the different purchasing criteria related to climate impact in the purchasing process of heavy road freight transport in Sweden, as well as the potential for using emission data as a purchasing criterion. The following three research questions were asked:

1. What purchasing criteria are currently being used in the purchasing of heavy road freight transports that are related to climate impact in Sweden?
2. Are these criteria currently used as qualifiers or order-winners in Sweden?
3. What drivers, enablers and barriers do buyers and sellers recognize currently exist for the use of emission data as a purchasing criterion for heavy road freight transports in Sweden?

The scope was limited to the business-to-business segment, and 10 interviews were conducted with customers from the forest; construction; and food industry. In addition, two interviews were done with transport operators.

The results identified nine criteria related to environmental impact. However, no company currently used emission data as a criterion. This was not surprising because of the lesser importance that is attributed to environment compared to other attributes (which earlier research has showed). None of the criteria were merely qualifier or order-winner – the status instead shifted depending on the

company. The exploration of emission data as a criterion revealed the continuing issue of lack of standardization. This was in line with what earlier research showed and supports the initiative CountEmissions EU which EU is currently working on (mid 2022) to increase clarity on calculation and reporting of emissions. Yet, examples of drivers are customers' demand and internal management. Finally, while enablers were more challenging to identify, new technical solutions was one.

To encompass the empirical research, Figure 8 shows the theoretical model which was proposed after a literature study. The model shows the origin of customer value and how the decision-making process works.

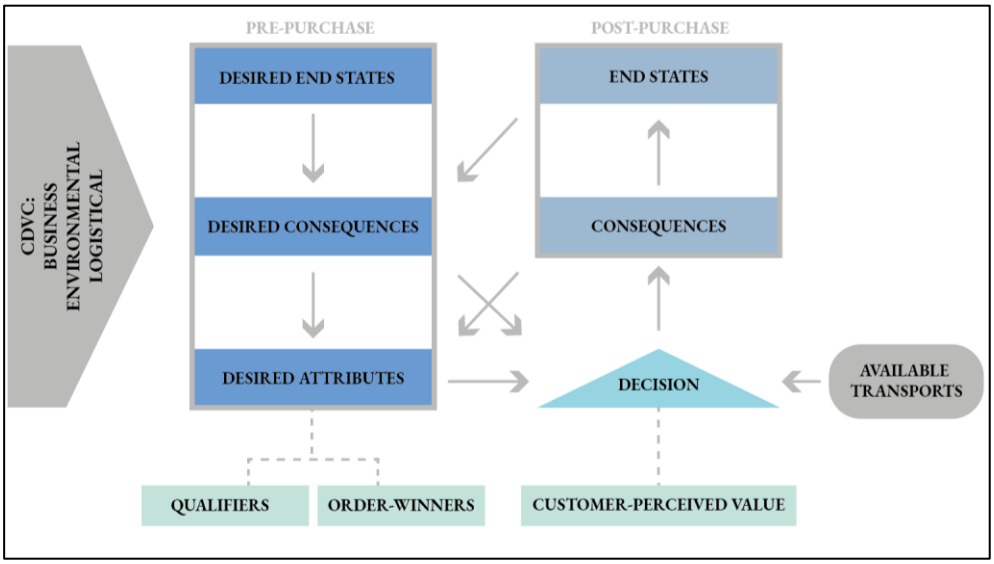

Figure 8: The proposed theoretical model

8.2 Research implications

This thesis has further researched and explored the use of environmental criteria in purchasing of road transport (in Sweden), continuing the work of earlier published studies. More specifically, the three research questions (in short): (1) which environmental criteria are used; (2) are these qualifiers or order-winners;

(3) drivers, enablers and, barriers for emission data; were earlier not answered and help contribute with new findings to the field.

The proposed model in Figure 8 gives new perspectives of the customer's purchasing process, combining Lammgård's work with theory of the customer value hierarchy and Hill's order qualifiers and order-winners.

8.3 Managerial implications

The contribution of this master's thesis is providing insights to what shippers are looking at when purchasing road transport services in Sweden. This information can be particularly interesting for transport operators. An example of how the information can be used is steering marketing activities in order to fit these criteria, particularly from an environmental perspective. Furthermore, another contribution from the study is perceptions on drivers, barriers, and enablers for using emission data as a purchasing criterion. This is relevant given the ongoing work (e.g., CountEmissions EU) to improve the conditions for calculation and reporting of emissions.

The study highlights different environmental purchasing criteria and categorize them into order-winners and order qualifiers. This is valuable information for shippers not currently putting emphasis on environmental aspects in the purchasing process. The study can serve as guidance and inspiration of criteria for other firms to potentially consider.

8.4 Limitations

Three identified limitations of the research are worth discussing and are presented in this section.

First, the results were impacted by the study just involving larger companies. Earlier research (e.g., Lammgård (2007)) had showed that smaller companies in general care less about environmental factors than larger ones. However, as

emission data is a relatively novel and developing area, the likelihood of progress with larger companies was significantly higher and thus more interesting to explore.[4] Likely, this skewed the results to be more optimistic of environmental data in purchasing and show higher degree of use than the actual reality.

Second, it is also possible that the interviewees' answers, either consciously or unconsciously, deflected from their actual behaviour. For example, it could be argued that showing environmental concern is seen as a positive trait, something which might impact responses to related questions.

Third, the limited sampling size results in that constrains apply when wanting to draw certain conclusions. Particularly in scenarios when comparing the different customer segments. This is also amplified in research question 1 and 2 by the results not certainly representing an exhaustive list, creating issues when comparing different companies. The reason for this it that the interviews allowed the interviewee to bring up the aspects they looked at, but no given criteria were listed beforehand; this means that the interviewee could have missed some aspects or take some for granted without mentioning them. An example of this is the criterion *sustainability criteria for road transport by the Swedish Forest Industries Federation*. All the interviewed companies in the forest interviews are members of the federation, and probably use the shared policy. Still, only two companies out of five mentioned it. While it could be that they just don't use it, it is possible that they just forgot to mention. However, it was never in the scope of the research to draw these types of conclusions.

[4] This is also remarked on in the results and conclusions.

8.5 Future research

A potential next step is a study focusing on SMEs and/or additional customer segments. Only large shippers in the forest; food; and construction industries (in addition to transport operators) were interviewed in this thesis. SMEs would in general probably give other results; thus, potentially further increase the understanding and give additional insight into environmental factors in purchasing. Supplementary customer segments would accommodate drawing new conclusions with increased generalizability for the entire road freight transport industry. Also, other countries can be considered.

Regarding the second limitation, a proposal to complement this thesis is to study the purchasing processes directly at the buyer as they are taking place and validate if the behaviour matches the results here. This could further establish the validity and bring new insights from a different social environment.

Another direction to continue the work done here is to complete additional research focusing on comparing different customer segments. This could be accomplished by for example interviews (with larger sample size), or a survey study. This could be valuable from multiple aspects (depending on the research design), for example: (1) allow transport sellers to target customers with better tailored service offers; (2) eventual differences could subsequently be researched to in the future understand how the road freight transport industry can be influenced to become more environmentally friendly.

References

2050. (2020). *Klimatredovisning bland de stora bolagen på Stockholmsbörsen*. 2050. https://2050.se/wp-content/uploads/2020/12/Klimatredovisning-bland-de-stora-bolagen-pa-Stockholmsborsen-2020.pdf

Becker-Olsen, K., & Potucek, S. (2013). Greenwashing. In S. O. Idowu, N. Capaldi, L. Zu, & A. D. Gupta (Eds.), *Encyclopedia of Corporate Social Responsibility* (pp. 1318–1323). Springer. https://doi.org/10.1007/978-3-642-28036-8_104

Björklund, M. (2005). *Purchasing practices of environmentally preferable transport services, Guidance to increased shipper considerations* [Thesis/docmono, Lund University]. http://lup.lub.lu.se/record/24974

Björklund, M. (2011). Influence from the business environment on environmental purchasing—Drivers and of purchasing green transportation services | Elsevier Enhanced Reader. *Journal of Purchasing & Supply Management*, *17*, 11–22. https://doi.org/10.1016/j.pursup.2010.04.002

Bryman, A., & Bell, E. (2017). *Företagsekonomiska forskningsmetoder* (3rd ed.). Liber AB.

Carbon Trust. (n.d.). *Product carbon footprint label*. Https://Www.Carbontrust.Com/What-We-Do/Assurance-and-Certification/Product-Carbon-Footprint-Label. Retrieved 17 April 2022, from https://www.carbontrust.com/what-we-do/assurance-and-certification/product-carbon-footprint-label

Deloitte. (n.d.). *Sustainability & Consumer Behaviour 2021*. Deloitte United Kingdom. Retrieved 15 March 2022, from

https://www2.deloitte.com/uk/en/pages/consumer-business/articles/sustainable-consumer.html

Directive 2014/95/EU of the European Parliament and of the Council, CONSIL, EP, 330 OJ L (2014). http://data.europa.eu/eli/dir/2014/95/oj/eng

Ecopoint. (n.d.). *Emission Standards: Europe: Heavy-Duty Truck and Bus Engines*. Retrieved 4 April 2022, from https://dieselnet.com/standards/eu/hd.php

Ehrler, V. C., & Seidel, S. (2014). A Standardisation of the Calculation of CO2(e) Emissions Along Supply Chains: Challenges and Requirements Beyond EN 16258. In B. Funk, P. Niemeyer, & J. M. Gómez (Eds.), *Information Technology in Environmental Engineering: Selected Contributions to the Sixth International Conference on Information Technologies in Environmental Engineering (ITEE2013)* (pp. 191–200). Springer. https://doi.org/10.1007/978-3-642-36011-4_16

Energimyndigheten. (2020, June 2). *Greenhouse gas reduction mandate*. https://www.energimyndigheten.se/en/sustainability/sustainable-fuels/greenhouse-gas-reduction-mandate/

Eng-Larsson, F., & Norrman, A. (2014). Modal shift for greener logistics − exploring the role of the contract. *International Journal of Physical Distribution & Logistics Management*, *44*(10), 721–743. https://doi.org/10.1108/IJPDLM-07-2013-0182

European Commission. (n.d.-a). *Corporate sustainability reporting* [Text]. European Commission - European Commission. Retrieved 15 March 2022, from https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

European Commission. (n.d.-b). *Count your transport emissions – 'CountEmissions EU'*. Have Your Say. Retrieved 15 March 2022, from https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13217-Count-your-transport-emissions-%E2%80%98CountEmissions-EU%E2%80%99_en

European Commission. (n.d.-c). *Initiative on substantiating green claims*. Retrieved 17 April 2022, from https://ec.europa.eu/environment/eussd/smgp/initiative_on_green_claims.htm

Finansinspektionen. (2022, January 18). *Sustainability reporting*. https://www.fi.se/en/hallbarhet/sustainability-regulations/sustainability-reporting/

Flint, D. J., Woodruff, R. B., & Gardial, S. F. (2002). Exploring the Phenomenon of Customers' Desired Value Change in a Business-to-Business Context. *Journal of Marketing*, *66*(4), 102–117. https://doi.org/10.1509/jmkg.66.4.102.18517

Gelderman, C. J., Schijns, J., Lambrechts, W., & Vijgen, S. (2021). Green marketing as an environmental practice: The impact on green satisfaction and green loyalty in a business-to-business context. *Business Strategy and the Environment*, *30*(4), 2061–2076. https://doi.org/10.1002/bse.2732

Giunipero, L. C., Hooker, R. E., & Denslow, D. (2012). Purchasing and supply management sustainability: Drivers and barriers. *Journal of Purchasing and Supply Management*, *18*(4), 258–269. https://doi.org/10.1016/j.pursup.2012.06.003

Groening, C., Inman, J. J., & Ross, W. T. (2014). Carbon Footprints in the Sand: Marketing in the Age of Sustainability. *Customer Needs and*

Solutions, *1*(1), 40–51. https://doi.org/10.1007/s40547-013-0005-5

Gronroos, C. (1990). Relationship approach to marketing in service contexts: The marketing and organizational behavior interface. *Journal of Business Research*, *20*(1), 3–11. https://doi.org/10.1016/0148-2963(90)90037-E

Hill, A., & Hill, T. (2009). *Manufacturing Operations Strategy*. Palgrave Macmillan.

Holmström, C. (2022, March 15). *Reduktionsplikt*. Ekonomifakta. https://www.ekonomifakta.se/Fakta/Energi/Styrmedel/reduktionsplikt/

Kalesnik, V., Wilkens, M., & Zink, J. (2020). *Green Data or Greenwashing? Do Corporate Carbon Emissions Data Enable Investors to Mitigate Climate Change?* (SSRN Scholarly Paper No. 3722973). Social Science Research Network. https://doi.org/10.2139/ssrn.3722973

Kotler, P., Armstrong, G., & Parment, A. (2016). *Principles of Marketing, Scandinavian Edition* (2nd ed.). Pearson Education Limited.

Lammgård, C. (2007). *Environmental perspectives on marketing of freight transports: The intermodal road-rail case*. BAS Pub.

Lammgård, C., & Andersson, D. (2014). Environmental considerations and trade-offs in purchasing of transportation services. *Research in Transportation Business & Management*, *10*, 45–52. https://doi.org/10.1016/j.rtbm.2014.04.003

Lundsgård, J. (2022, February 6). Dieselpriserna slår hårt mot åkerierna – konkursvåg hotar. *Dagens industri*. https://www.di.se/nyheter/dieselpriserna-slar-hart-mot-akerierna-konkursvag-hotar/

Miljöfordon.se. (2020, December 22). *Miljöklasser*. https://www.miljofordon.se/bilar/vad-aer-miljoebil/miljoeklasser/

Naturvårdsverket. (n.d.). *Inrikes transporter, utsläpp av växthusgaser*. Naturvårdsverket. Retrieved 4 April 2022, from https://www.naturvardsverket.se/data-och-statistik/klimat/vaxthusgaser-utslapp-fran-inrikes-transporter/

Palmer, A. (2013). *EBOOK: Principles of Services Marketing*. McGraw Hill.

Persson, T. (2019, October 17). *”Tydliga förväntningar från investerare att bolag ska utsläppsredovisa”*. https://www.aktuellhallbarhet.se/miljo/klimat/tydliga-forvantningar-fran-investerare-att-bolag-ska-utslappsredovisa/

Philipp, B., & Militaru, D. (2011). Shippers’ ecological buying behaviour towards logistics services in France. *International Journal of Logistics Research and Applications*, *14*(6), 413–426. https://doi.org/10.1080/13675567.2011.649547

Porter, M. E., Serafeim, G., & Kramer, M. (2019). Where ESG Fails. *Institutional Investor*.

Ravald, A., & Grönroos, C. (1996). The value concept and relationship marketing. *European Journal of Marketing*, *30*(2), 19–30. https://doi.org/10.1108/03090569610106626

Roy, M.-J., & Vézina, R. (2001). Environmental Performance as a Basis for Competitive Strategy: Opportunities and Threats. *Corporate Environmental Strategy*, *8*(4), 339–347. https://doi.org/10.1016/S1066-7938(01)00118-X

Sanderson, J., Lonsdale, C., Mannion, R., & Matharu, T. (2015). Towards a

framework for enhancing procurement and supply chain management practice in the NHS: lessons for managers and clinicians from a synthesis of the theoretical and empirical literature. In *Towards a framework for enhancing procurement and supply chain management practice in the NHS: lessons for managers and clinicians from a synthesis of the theoretical and empirical literature*. NIHR Journals Library. https://www.ncbi.nlm.nih.gov/books/NBK286086/

SIS. (2012). *Standard—Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers) SS-EN 16258:2012—Swedish Institute for Standards, SIS*. Svenska Institutet För Standarder, SIS. https://www.sis.se/en/produkter/sociology-services-company-organization/services/services-for-consumers/ssen162582012/

Statens energimyndighet. (n.d.). *Drivmedel 2018* (ER 2019:14). Retrieved 6 April 2020, from https://www.energimyndigheten.se/globalassets/statistik/drivmedel-2018.pdf

Styhre, L., & Andersson, D. (2020). *Transportinköpspanelen | Chalmers* [Survey]. https://www.chalmers.se/sv/centrum/northern-lead/transportinkopspanelen/Sidor/default.aspx

Support Sustainable Development and Climate Action. (n.d.). United Nations; United Nations. Retrieved 17 April 2022, from https://www.un.org/en/our-work/support-sustainable-development-and-climate-action

Sustainability criteria for road transport. (2022). Skogsindustrierna. https://www.skogsindustrierna.se/siteassets/dokument/transport/sfif-

sustainability-criteria-for-road-transport2.pdf

Sveriges Åkeriföretag. (n.d.). *Om åkerinäringen*. Retrieved 6 April 2022, from https://www.akeri.se/en/node/292

Sveriges åkeriföretag. (n.d.). *Svart på vitt om åkerinäringen* (p. 13).

Tanner, J. F. (1999). Organizational Buying Theories: A Bridge to Relationships Theory. *Industrial Marketing Management*, *28*(3), 245–255. https://doi.org/10.1016/S0019-8501(98)00052-2

The Climate Decade: Changing Attitudes on Three Continents. (n.d.). Resources for the Future. Retrieved 15 March 2022, from https://www.rff.org/publications/working-papers/the-climate-decade-changing-attitudes-on-three-continents/

Trafikanalys. (2022). *Lastbilstrafik 2020*. https://www.trafa.se/vagtrafik/lastbilstrafik/

Vastag, G. (n.d.). *Order-Winning and Order-Qualifying Criteria—Strategy, organization, system, advantages, school, model, company, business, competitiveness*. Retrieved 22 March 2022, from https://www.referenceforbusiness.com/management/Ob-Or/Order-Winning-and-Order-Qualifying-Criteria.html

Walker, H., Di Sisto, L., & McBain, D. (2008). Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors. *Journal of Purchasing and Supply Management*, *14*(1), 69–85. https://doi.org/10.1016/j.pursup.2008.01.007

Westman, T. (n.d.). *NFRD blir CSRD – nya förändringar av direktivet i EU - KPMG Sverige*. KPMG. Retrieved 12 April 2022, from https://home.kpmg/se/sv/home/nyheter-rapporter/2021/04/nfrd-blir-csrd-

nya-forandringar-av-direktivet-i-eu.html

Wild, P. (2021). Recommendations for a future global CO2-calculation standard for transport and logistics. *Transportation Research Part D: Transport and Environment*, *100*, 103024. https://doi.org/10.1016/j.trd.2021.103024

Wilson, E. J. (1996). Theory transitions in organizational buying behavior research. *Journal of Business & Industrial Marketing*, *11*(6), 7–19. https://doi.org/10.1108/08858629610151271

Winston, A. (2010, April 15). Avoiding Greenwash and Its Dangers. *Harvard Business Review*. https://hbr.org/2010/04/avoiding-greenwash-and-its-dan

Woodruff, R. B., & Flint, D. J. (2003). RESEARCH ON BUSINESS-TO-BUSINESS CUSTOMER VALUE AND SATISFACTION. In A. G. Woodside (Ed.), *Evaluating Marketing Actions and Outcomes* (Vol. 12, pp. 515–547). Emerald Group Publishing Limited. https://doi.org/10.1016/S1069-0964(03)12008-X

Appendices

Appendix A: Interview guide – buyers

Allmänna frågor

- Vill du vara anonym?
- Hur skulle du beskriva ditt företags verksamhet?
- Hur skulle du beskriva din roll på företaget?
- Hur länge har du arbetat på företaget?

Gallringsfrågor

- Köper ditt företag in åkeritjänster?
- Är du insatt i inköpen av dem tjänsterna?

Köpprocessen

- Hur går det till när ni väljer transportör för vägtransport?
- Vilka är inblandade i köpprocessen?
    - Vilken roll spelar dessa?

Köpkriterier

- Vilka faktorer tittar ni på när ni ska välja transportör?
    - (Ifall inte nämnts) Tittar ni något på faktorer kopplade till miljö/växthusgasemissioner?
- Vilka av dessa faktorer är krav som måste uppfyllas?
    - Vem avgör vilka dessa krav är?
    - Vad påverkar vilka dessa krav är?
- Vilka av dessa faktorer avgör främst vilken leverantör ni slutgiltigen väljer?
    - Vem avgör vilka dessa krav är?
    - Vad påverkar vilka dessa krav är?

Emissionsdata

- Vad är din inställning till att använda emissionsdata som ett köpkriterium?
    - Varför?
- Vad fungerar bra/mindre bra med emissionsdata som köpkriterium?
    - Tror ni framgent att emissionsdata kan jämföras enklare mellan transportörer och i så fall få större vikt?

Framtidsscenario

- Har rollen som faktorer kopplade till miljö/klimat spelar förändrats under senaste 5 åren?
    - Hur då?
    - Varför?
- Tror du att rollen som faktorer kopplade till miljö/klimat spelar kommer förändras framöver?
    - Hur då?
    - Varför?

Avslutande frågor

- Vad tycker du att jag borde frågat om men inte gjorde?

Appendix B: Interview guide – sellers

Allmänna frågor

- Vill du vara anonym?
- Hur skulle du beskriva ditt företags verksamhet?
- Hur skulle du beskriva din roll på företaget?
- Hur länge har du arbetat på företaget?

Gallringsfrågor

- Är du insatt i försäljningen av era åkeritjänster?
- Vilka branscher tillhör era kunder?

Säljprocessen

- Hur går det till när ni säljer in era tjänster till kund?
- Vilka är inblandade i säljprocessen?
    - Vilken roll spelar dessa?

Köpkriterier

- Vilken information delger ni till kunden?
    - (Ifall inte nämnts) Vilka faktorer kopplade till miljö/växthusgasemissioner?
- Vilka faktorer upplever ni att kunden fokuserar (mest) på?
    - Varför då?
- Upplever ni att vissa krav är kvalificerare/vinnare?
- Hur försöker ni särskilja er från konkurrenter?
    - Varför då?

Emissionsdata

- Vad är din inställning till att använda emissionsdata som ett köpkriterium?
    - Varför?
- Vad fungerar bra/mindre bra med emissionsdata som köpkriterium?

Framtidsscenario

- Har rollen som faktorer kopplade till miljö/klimat spelar förändrats under senaste 5 åren?
    - Hur då?
    - Varför?
- Tror du att rollen som faktorer kopplade till miljö/klimat spelar kommer förändras framöver?
    - Hur då?

- Varför?

Avslutande frågor

- Vad tycker du att jag borde frågat om men inte gjorde?