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Reformation of the tender process for transport to support the growth of sustainable transport solutions

Master's thesis in Supply Chain Management

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CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2023
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Report No. E2023:042

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SUMMARY
Today 95% of the road freight industry is based on fossil fuels. There are successful implementations of sustainable transport solutions, however the progression has been slow. This thesis investigates the possibility that the slow advancement of the sustainable transport industry is affected by an inherent bias for fossil fuels in the transport tendering process used today. Hence, to support the growth of sustainable transport solutions a reformed tendering process, The WACK model, is developed in two steps. Firstly, The WACK model is derived from three existing procurement models. Secondly, guiding questions are developed from The WACK model to ensure a sustainability focus. To investigate the guiding questions a qualitative interview study is conducted followed by an analysis consisting of a gap analysis and a workshop. The analysis found three results that can adjust The WACK model to ensure a sustainability focus. These adaptations are: Knowledge exchange, Alternative measuring criteria and Dedicated tendering process. With the adaptations, The WACK model paves the way for the growth of sustainable transport solutions..

Keywords: Sustainable transport, Tendering, Sustainable procurement.

Acknowledgements

We would like to express our heartfelt gratitude to all those who have supported and guided us throughout the process of completing this master's thesis.
First and foremost, we are grateful to our supervisor, Kajsa Hulthén, for her support, invaluable guidance, and expert knowledge. Her dedication and commitment to our academic growth have been instrumental in shaping this thesis.

We would also like to extend our gratitude to our supervisor at STP for his commitment to our master thesis and insightful comments.

Finally, we would like to express our appreciation to all the participants who generously contributed their time and knowledge to this study. Without their willingness to participate, this research would not have been possible.
Thank you all.

Andrea Carlberg & Karin Wulfsberg

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1 Introduction

Despite the availability of multiple sustainable transport solutions, the global road freight industry still heavily relies on fossil fuel, with sustainable options accounting for less than 5% of the total (Browne, Dubois, and Hulthén, 2022). Although there are successful implementations of sustainable transport solutions, the progress of sustainable freight solutions has been slow. One aspect of the transport industry that has not changed with the advancement of technology in the transport sector, is the standardized tendering process used to procure freight transport. In the past, fossil transport solutions have been the only fuel option, hence the tendering process has been adapted thereafter. Consequently, there may be an inherent bias in the tendering process that favors fossil fuels which contributes to the limited procurement of sustainable options. To address this issue, this master thesis aims to investigate the current tendering process in road freight procurement and propose an alternative model to facilitate the growth of sustainable transport. The study will be conducted in collaboration with a sustainable transport provider, henceforth referred to as STP.

This master thesis is written with the intention of being applicable to several sustainable transport solutions. However, cases of electric road transport solutions have been used to showcase specific examples throughout the study. Moreover, the focus of the analysis has been on electric road transport solutions but with a broader view in mind allowing the result to be applicable to several sustainable freight transport solutions.

To gain a deeper understanding of the problem presented above, this chapter explores the current state of the transport market as well as gives a background to sustainable considerations in contemporary tendering.

1.1 The current state of the transport market

Today transport generates about 8% of the CO_2 emissions in Europe. Of that, road transport is responsible for 87%, of which heavy and light duty vehicles are responsible for 11% (European Environment Agency, 2022). Hence, freight transport in Europe produces approximately 47,500-tons CO_2 yearly. At the same time, world changing events have put a spotlight on supply chains and freight transport, highlighting its importance to a firm's success. Global pandemics, climate change and geopolitical disruptions have brought new challenges for supply chains and, according to STP, exposed some of the flaws in the system such as global container imbalance. Concurrently, global trade has and is still increasing and so is the demand for transported goods. Hence, compared to other sectors which have seen a stabilization of their CO_2 emissions during recent years, the transport sector’s emissions continue to grow according to Lammgård and Andersson (2014). They also point out that environmental sustainability is becoming a key issue for various stakeholders. Consequently, environmental sustainability needs to be the basis in all strategic decisions moving forward. Thus, it can be concluded that the transport industry is in dire need of a change in order to keep up with the expectations of stakeholders, but also to reach the global sustainability goals. This section describes the contemporary transport market and some underlying factors to why it looks this way.

According to Browne et al. (2022) the transport market today is fragmented and loosely coupled. The pattern of couplings determines the level of integration within a system and a deeper understanding of the pattern is a necessity to be able to change the system. The transport system today is created around oil and to make the system more sustainable it is not enough to just present alternatives, the coupling too needs to fundamentally change (Browne et al., 2022). STP has also noted the loose coupling in the transport system today. They have observed that the information flow and participants involved in the current transport system are decentralized. STP found that trucks operate independently without knowledge of the other vehicles' destination or cargo. While the decentralized approach has been functional in the past, there has been little incentive to update the system as the advancement of sustainable transport solutions has been slow. STP notes that the lack of development in the transport sector is evident in the declining research and development (R&D) budgets of companies for innovative transport solutions over recent years.

The transport market consists of some large actors but most of the carriers are small businesses with just one or a few trucks operating in temporal and shifting business exchanges (Browne et al., 2022). The ten largest transport providers in EU have about 11% of the market share, the rest are distributed over companies with less than 10 employees (Liachovicius and Skrickij, 2020). Furthermore, the transport market is spot-oriented. The transport solutions are regulated by contracts of varying length and are bought on a spot basis, where price is the most important factor for the shipper (Lammgård and Andersson, 2014). According to STP the profit margins in the transport industry are low. To further complicate the issue, transport decisions are usually taken last, adapting to the decisions already in place for manufacturing and supply (Browne et al., 2022).

Moreover, the transport market today is fossil fuel oriented. Today 95% of the energy consumed in the transport sector comes from oil-based sources (Browne et al., 2022). To reach the global sustainability goal of net zero emissions by 2050 the transport market, and the fuel especially, needs to change. However, globalization has made part of the world accustomed to a certain lifestyle and as mentioned before, the demand for transported goods continues to grow. Hence, the decrease of CO_2 emissions due to more sustainable fuels is obsolete compared to the rise in demand (Browne et al., 2022).

The road infrastructure that exists today is standardized and adapted towards fossil fuels bringing further challenges for the switch towards more sustainable alternatives. The lack of sustainable fuel infrastructure, and thus limitations in range and flexibility, is one of the largest hindrances facing the sustainable freight market (Wanniarachchi et al., 2022).

1.2 Climate considerations in contemporary tendering

When measuring environmental impact in the transport market today, CO_2 is the most used criteria (Wolf and Seuring, 2010). However, there is no commonly used method of analyzing the result from the CO_2 measurement, and little experience in how these numbers can be monetized to give the measurement a comparable economical value.

According to Wolf and Seuring (2010), economic and environmental aspects are delt with separately.

A commonly used approach for firms to reach their internal sustainability goals is Green Supply Chain Management (GSCM) (Davis-Sramek, Robinson, Darby and Thomas, 2020). The goal of using GSCM is to reduce the negative environmental impacts in the companies supply chains. The easiest way to incorporate GSCM is by using sustainable criteria in the supplier selection process. GSCM can include environmental, economic and social sustainability goals. According to Davis-Sramek et al. (2020), the key to success within GSCM is early involvement and active participation in the supplier selection process.

In response to increased international pressure to protect the environment, a growing trend of integrating green practices into supply chains is noticed today (Jazairy and von Haartman, 2020). There are several institutional pressures for different actors in the transport sector to implement GSCM practices into their business. The first one mentioned is regulatory pressures. As of today, regulations are not very strict resulting in the current environmental policies mainly influencing the internal activities at the company. However, Jazairy and von Haartman (2020) highlight that shippers would have higher green demands on their logistics providers if they were motivated by stricter regulations. A second driver for GSCM in the transport sector is the market pressure. The end-customers' environmental demands put pressure on the shipper, in turn, pressuring the logistics providers to find appropriate solutions. Hence, logistics providers are motivated to provide green solutions to increase their profitability as it attract shippers. The competitiveness of offering green solutions then becomes a third pressure to implement GSCM practices as it is one way to differentiate from other businesses (Jazairy and von Haartman, 2020).

2 Aim

The aim of this master thesis is to investigate the tendering processes used by shippers today and suggest an alternative process supporting the growth of sustainable transport solutions.

3 Analytical framework

To structure the thesis and to achieve the aim, a framework has been developed. The framework is built as a guide to navigate through the research and organize the findings. To structure the framework, a model for transport tendering is developed. The aim of developing a new model is to understand how the tendering process is structured today and create a tendering process that is customized for the transport sector. *The WACK model* is derived from a combination of three existing tendering models: *The tendering process by van Weele and Rozemeijer* (van Weele and Rozemeijer, 2022), *The tendering process by Rogerson* (Rogerson, 2014), and *The tendering process by Trafikverket* (Moen, 2016).

The WACK model is broken down into guiding questions which set the base for the data collection and guide the analysis. Through the guiding questions the aim is reached.

This chapter is divided into two parts. Part one develops *The WACK mode*l on which the framework can be built. Part two sets the framework of the thesis. Part two includes both the guiding questions derived from *The WACK model* and the analysis method used to answer the questions.

3.1 Part 1: Development of a new tendering model

To structure the framework a new model for transport tendering is developed. The model is created through the combination of three existing tendering models. *The WACK model* is adapted for the tendering of road freight transport but could be applicable for all types of freight transport. *The WACK model* could be seen as a reformed tendering process by itself. However, in this thesis it will primarily be used as a guide to set questions that investigate all aspects of a transport tender reformation.

3.1.1 The tendering process by van Weele and Rozemeijer

Van Weele and Rozemeijer (2022) have developed a commonly used tendering process that can be divided into six different steps, Figure 1.

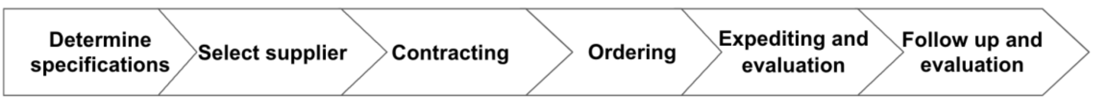

Figure 1: The tendering process according to van Weele and Rozemeijer (2022)

The first step is to *Determine specifications* for the purchase. These specifications illustrate the functionality the solution must provide the user with, and what technical specifications are required. In a procurement process that deals with transport there are a few commonly used business parameters often taken into consideration when the specifications are set (Holter, Grant, Ritchie and Shaw, 2008). These are for example freight cost and related charges (such as fuel and driver expenses), transport visibility (such as track-and-trace services) and on-time delivery. Freight cost and related charges are in many cases the largest cost element when it comes to logistics, making it an important business parameter for shippers.

The second step is *Select supplier* where the buying company issues a request for information (RFI) and a request for quotation (RFQ). This results in a supplier selection proposal (van Weele and Rozemeijer, 2022). Supplier selection can be based on the parameters brought up by Holter et al. (2008) but could also be based on environmentally focused performance metrics such as fill rate, access to computer models for fleet management, age of the vehicles, what fuel is used and type of tires (Björklund and Forslund, 2013).

Supplier selection is followed by *Contracting* where both contracting and negotiating expertise are needed (van Weele and Rozemeijer, 2022). In this stage the price mechanism is set, penalties and warranties are decided as well as terms of payment and delivery. According to Beier (1989) contracts for transport should be seen as an opportunity for growth since both carriers and shippers can ensure a long-term business agreement.

The next step in the procurement process is *Ordering*. The order could be manually or automatically initiated depending on the complexity of the service. The ordering should include order number, solution description, price, order quantity, expected delivery times and delivery address.

The final two steps in the procurement process are *Expediting and evaluation* and *Follow-up and evaluation*, where it is reviewed whether the suppliers fulfilled their promises or not. Criteria which could be looked upon are quality, delivery, competitiveness or innovativeness. Expediting is a useful step for the next supplier selection phase as insightful information can be stored within the company. A transport management system could potentially direct necessary information to the appropriate individuals and support business operations crucial to internal transport management (Holter et al., 2008).

3.1.2 The tendering process by Rogerson

Rogerson (2014) has adapted *The tendering process by van Weele and Rozemeijer* (van Weele and Rozemeijer, 2022) to better explain the procurement of transport and understand how the different steps are affected by the context. The model focuses on the steps leading up to contractual agreement since these are the steps most influenceable to context. Rogerson (2014) observed through case studies variations of typical procurement processes for transport today, as well as how the relationship and context affect the procurement strategy. Figure 2 shows one of the regular processes found.

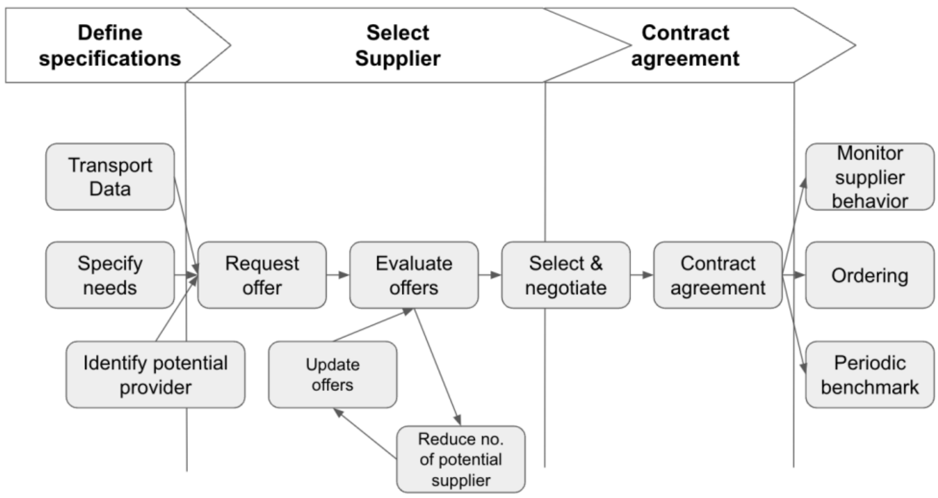

Figure 2: Rogerson's (2014) transport procurement model

The *Define specifications* stage is affected by the characteristics of the purchase. Longer time is needed in this stage if the purchasing situation is new or complex. Rogerson (2014) determines how complex the situation is depending on the number of services purchased at the same time as well as the level of customization needed. The degree of difficulty in defining the specifications stage depends on the level of variation in size and location of the shipments. If it is a large shipment spread over multiple locations, more time is required for the *Define specifications* stage.

The relationship approach i.e., the desired characteristics of the relationship between shipper and provider, influences the *Select supplier* stage. If a closer relationship is desired, more focus must be spent on personal contact in the supplier selection process. One reason for wanting to keep the transport suppliers close is, according to Rogerson (2014), a wish for flexibility that can occur if a good relationship is in place. There is evidence that the type of recipient/shipper influences the decision to include environmental considerations in the supplier selection. In most of the cases studied by Rogerson (2014), the closer the shipper was to the end consumer the more environmental criteria were considered.

The C*ontract agreement* stage is influenced by the purchasing situation. Rogerson (2014) found that the maturity of the purchasing situation and the number of services purchased influence the length of the contracting stage. The supplier strategy and the supplier relationship approach also influence the contracting stage. Competitive bidding and arm's length relationships usually lead to negotiations while closer relationships usually lead to more detailed contracting since more detailed planning is desired. Rogerson (2014) also found that the contract stage is influenced by the variation of location and delivery requirement. The more variation the less detailed the contract is, in order to, for example, retain more flexible time windows for delivery. The shipment size is also found to be a factor that influenced the negotiations, as larger shipments can lead to bulk discounts.

3.1.3 The tendering process by Trafikverket

Trafikverket (Moen, 2016) presents an alternative tendering process, Figure 3.

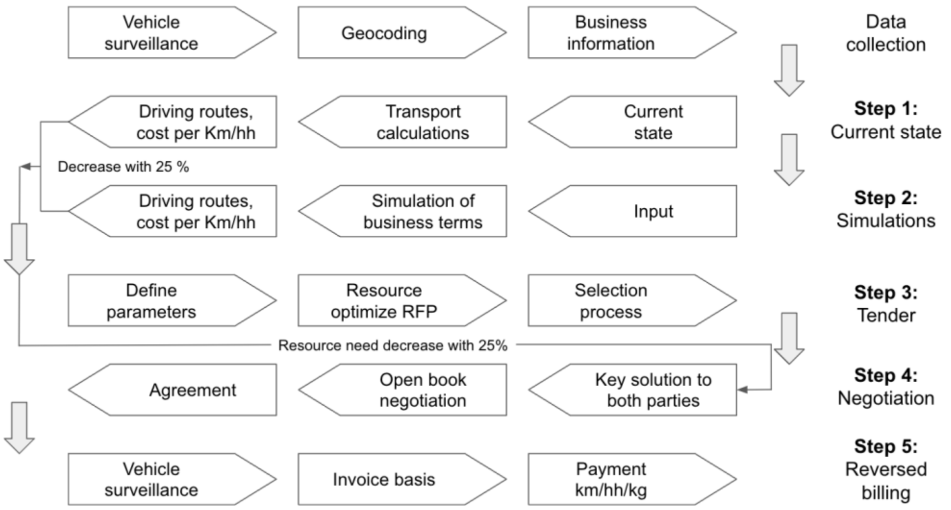

Figure 3: The tendering process by Trafikverket (Moen, 2016)

The tendering process by Trafikverket requires more commitment and knowledge than *The tendering process by van Weele and Rozemeijer* (van Weele and Rozemeijer, 2022), but it enables the shippers to get better control over the supply chain. *The tendering process by Trafikverket* is developed both from van Weele and Rozemeijer's (2022) and Rogerson's (2014) tendering models. The main difference is that *The tendering process by Trafikverket* is based on a current stage analysis. Hence, a more extensive pre-study needs to be conducted. The quality of the data collected in the pre-study determines the outcome of the tender. After the current stage analysis, a simulation step has been added to find a best-case scenario (in Figure 3; the highest reduction of driven km). By doing this, a goal can be set for the tender. The goal should be available for all actors in the process.

The third step in *The tendering process by Trafikverket* is forming the tender. From the result found in step one and two, the specifications can be defined. Once they are set, the request documents should be aligned with the goal and then a selection process can begin. The last two steps include negotiation and reversed billing of the selected supplier. These steps determine the specifications, such as contract length, between the shipper and the transport provider.

3.1.4 The WACK model

The WACK model combines the three models presented above. *The WACK model* can be used by itself to reconstruct the tendering process of shippers. However, in this thesis it is used as a guide to identify questions from which a broader reformation of the tendering process can be investigated.

As specified by Rogerson (2014) a new or complex purchasing situation requires more resources during the initial stages of the tendering process. As mentioned, 95% of the energy consumed in the transport market is oil-based (Browne et al. 2022). Hence, sustainable transport tendering can be seen as a new situation and therefore, according to Rogerson (2014), more resources are needed in the first steps of the tendering process.

Setting clear goals and sharing these with all actors as described in the *Simulations* step in the *Five-step process* (Moen, 2016,) is something *The WACK model* will incorporate. Having a clear view of the best-case solution and setting it as a common goal could help to focus the result of the tendering process by eliminating or excluding suppliers who do not meet the set goal.

Moreover, the focus of this thesis is on the steps leading up to, and including, selection of a supplier. Hence, contract agreement or any other later steps defined by van Weele and Rozemeijer (2022) will not be included since they are considered to remain the same regardless of the fuel of the tendered transport solution. *The WACK model* has the following structure, Figure 4.

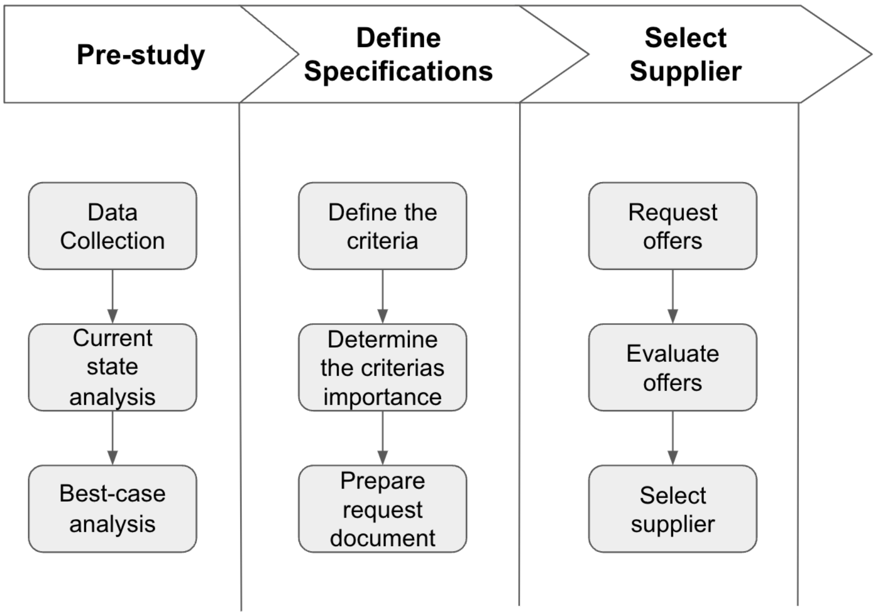

Figure 4: The WACK model

Firstly, a *Pre-study* should be performed to understand the shipper's limits and goals. This could be extensive and resource demanding if no previous knowledge is available. However, as mentioned by Moen (2016) the quality of the pre-study will determine the result of the tendering process. The *Pre-study* consists of three steps: *Data collection*, *Current stage analysis* and *Define goals*. These tasks should provide enough information to set up the tendering process.

The second step of the framework is *Define specifications*. The knowledge gained in the previous steps determines how the specifications are defined. This step includes three activities; *Define the criteria*, *Determine their importance* and *Prepare the request document*. The criteria are based on the requirements needed to reach the set goal, which are set in the *Define goals* step. The request document should include both the criteria and the goal determined during the *Pre-study*. The open book policy makes the process goal oriented (Moen, 2016).

The third and last step of the *The WACK model* is *Supplier selection*. According to STP, this has traditionally been an iterative process where the offer is sent back and forth between the shipper and the transport provider until the shipper has received enough information to make a decision. It will remain as such in this model, however, by having an open book policy and clearly sharing the goal, the iterative process can be kept short. This is due to the fact that the shippers can share their goals with the transport provider at an earlier stage, ensuring that the transport provider can offer a more customized solution to the shipper. This step consists of three stages; *Request offers*, *Evaluate offers* and *Select supplier*. The selection should be guided by the ranking made in the second step as well as the supplier relationship strategy chosen by the shipper. These steps lead to the selection of a supplier and then the process can continue according to *The tendering process by van Weele and Rozemeijer*. *The WACK model* is adapted for procuring transport solutions but to make it suitable for sustainable transport solutions guiding questions are developed.

3.2 Part 2: Development of thesis framework

To structure the thesis and to achieve the aim, a framework is developed. The framework is based on a set of questions that is derived from *The WACK model*. The questions are used to guide the thesis and set the base for the data collection and the analysis. The questions are designed to investigate and incorporate sustainability in *The WACK model* and thereby create an understanding of how transport tendering can be reformed to support the growth of sustainable transport solutions.

The framework consists of a set of questions. The questions are developed to deepen the model and investigate different solutions to the reformation of the tendering process. To answer the questions two methods of analysis will be used, a gap analysis and an evaluation matrix. The questions and the evaluation matrix are developed below. The last section contains a summary of the framework and a clear guide for the paper.

3.2.1 Guiding questions

The guiding questions are derived from *The WACK model*. The purpose of the guiding questions is to investigate how issues related to sustainability affect the tendering process. Through the questions, answers can be found to what needs to be considered to reform the tendering process to support the growth of sustainable transport. The guiding questions will investigate how sustainability can be incorporated in the tendering process and find suitable adaptations to *The WACK model*. Four guiding questions were identified.

The first guiding question investigates how the tendering of sustainable transport solutions differ from fossil transport solutions. The aim with GQ1 is to identify gaps in the tendering process used today, through a gap analysis. The answers to GQ1 lay the foundation for the following guiding questions and through them adaptations can be made to *The WACK model*.

GQ1: How does tendering sustainable transport solutions differ from tendering fossil transport solutions?

The second guiding question investigates what shippers need to consider when tendering sustainable transport solutions. This question develops the *Pre-study* step of *The WACK model*. The *Pre-study* consists of three parts: *Data collection, Current state analysis* and *Define goals.* The pre-study sets the frame for the following steps in the tendering process and determines where the shipper's focus will be. By investigating what the shippers need to consider when changing to a sustainable transport solution, sustainability can be incorporated in the *Pre-study* step.

GQ2: What do shippers need to consider when tendering sustainable transport solutions?

The third guiding question investigates how sustainability can be measured in the tendering process. This question affects all parts of *The WACK model* and will investigate how sustainable adaptations can be made to *The WACK model*.

GQ3: How can sustainability be measured in the tendering process?

The last guiding question investigates how the relationship between the shipper and the transport provider is affected by sustainability. The mindset of the shipper has an impact on the evaluation and selection of supplier, but it also determines which suppliers are invited to make an offer. GQ4 investigates how the supplier relationship is considered in *The WACK model* and how it can be adapted for sustainable transport solutions.

GQ4: How does the nature of the supplier relationship affect the tendering of sustainable transport solutions?

3.2.2 Gap analysis

To investigate the current and future state of the road freight industry and answer GQ1, a gap analysis is performed (Figure 5). Marra, Biccari, Lazoi and Corallo (2017) describe a gap analysis as the method to define the difference between a current state and a future state. There are two main questions in a gap analysis:

1) Where are we today?
2) Where do we want to be in the future?

The difference between these two questions is the gap and the result of the gap analysis should provide solutions to close the gap, to get from the current state to the future state. In this thesis the current state refers to the fossil fueled oriented transport market and the tendering process used by shippers today. The future state is the reformed tendering process and the growth of sustainable transport.

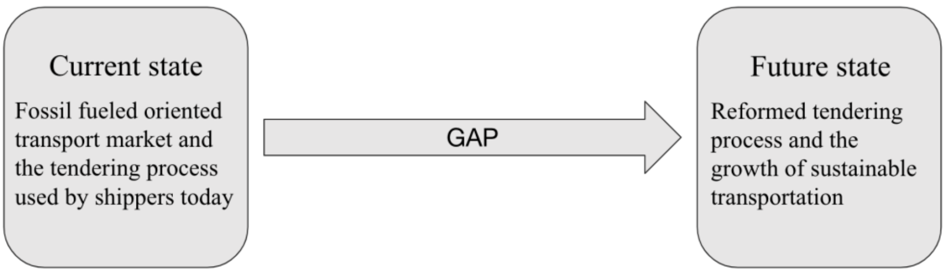

Figure 5: Gap analysis model

3.2.3 Evaluation matrix

To evaluate the criteria and solutions found during the gap analysis and to answer GQ2, GQ3 and GQ4, an evaluation matrix is set up. The matrix evaluates the solutions based on their importance to reach the aim (a reformed tendering process and a more sustainable road freight industry) and their ease of implementation (Figure 6).

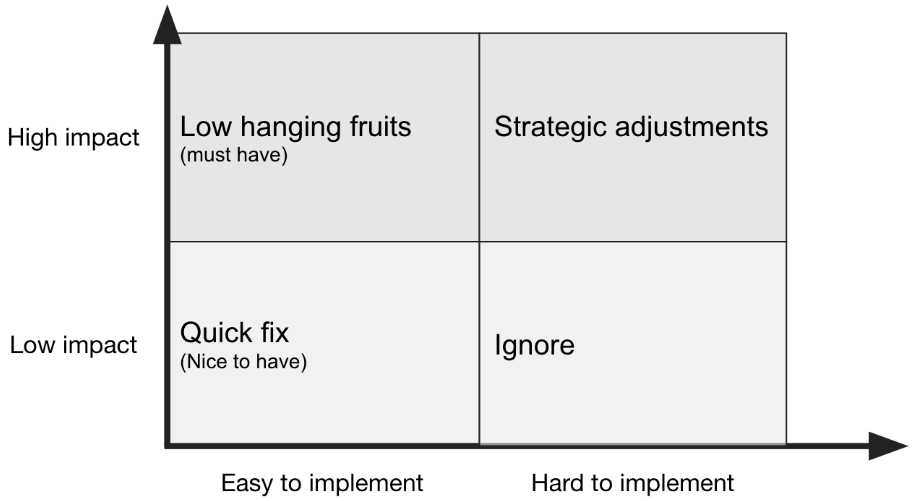

Figure 6: Evaluation matrix

The matrix can be classified into four quadrants, with the first quadrant (Q1) being labeled as *Quick Fix*. The solutions presented in this quadrant are relatively simple to execute but have a limited impact on the ultimate aim. Although these solutions may not result in significant change on their own, they can be valuable in achieving the overall goal, as a series of small changes can culminate in a substantial impact.

The second quadrant, Q2, is labeled as *Ignore*. Solutions in this quadrant are challenging to execute and are expected to have a minimal impact on the final outcome. Therefore, investing time and money in these solutions would not be worthwhile, and other solutions should be given priority.

The third quadrant, Q3, is classified as *Low Hanging Fruits*. Solutions in this quadrant are easy to implement and have a significant impact on the outcome. Therefore, these solutions should be prioritized, as they will result in substantial changes without requiring excessive resources. These solutions are considered must-haves.

The final quadrant, Q4, is referred to as *Strategic Adjustments*. Solutions in this quadrant are challenging to implement but are estimated to have a high impact on the outcome. Implementing these solutions may require a significant number of resources, but they could still be worth investing in. However, due to the high resource demand for each solution, it may be necessary to prioritize within the quadrant to determine which solutions should be taken into action.

3.3.4 Summary of the framework

To reach the aim of the thesis, a reformation of the tendering process to support the growth of sustainable transport solutions, a framework is developed. The framework consists of a model, *the WACK model*, and a set of questions, the guiding questions. The model is designed to give a base for a reformed tendering process. *The WACK model* can be used as it is, but the thesis will use the model to investigate how sustainability can be incorporated in the tendering process. The questions are designed to develop and investigate different aspects of *The WACK model* as well as look beyond the model to find solutions to the aim.

4 Method

In this section the method for the thesis is developed and discussed. Interviews were used as the main source of data collection while secondary data sources, such as case studies, were used to complete the gathering of data. The data was later analyzed through different methods of analysis to receive answers to the guiding questions and reach the aim of the thesis.

4.1 Research approach

The proposed method for this research is a qualitative interview study. Qualitative research aims to understand the subjective experiences and perspectives of individuals or groups in order to gain a deeper understanding of a phenomenon, rather than to quantify it. Qualitative research is particularly useful in exploratory research and in situations where quantitative data may not provide the full picture (Merriam and Tisdell, 2015).

According to Rossman and Rallis (2011), qualitative research has two main features; 1) The researcher is the resource from which the study is built on, and 2) The purpose is to learn from a social context. These two principles make the researcher more of a creator of knowledge than just a receiver of it. The data collected during the study is transformed by the researcher and new knowledge is gained. A qualitative study normally does not have a predefined hypothesis. Instead, a framework with guiding questions is more common (Rossman and Rallis, 2011). The questions are not rigid as they can change over the course of the study when new knowledge leads to new and more interesting questions.

Qualitative research requires an overview of the pertinent literature (Eriksson and Wiedersheim-Paul, 2008). As a result, studying literature helps to gain a theoretical comprehension of the assignment. In this thesis the collection of the literature is completed utilizing both online sources, such as Google Scholar and databases provided through Chalmers Library, as well as information provided by STP. This knowledge was the foundation for the theoretical framework. Through the use of multiple sources, a broad understanding could be ensured.

4.2 Data collection

The requisite data for the study was collected through two distinct means: first, by conducting interviews with relevant experts; second, by scrutinizing the findings of two distinct case studies conducted by STP.

4.2.1 Interviews

The interviews were conducted in a semi-structured manner. Beforehand, a set of questions was developed with the guiding questions defined in the framework as a base, and, wherever appropriate, follow-up questions were asked as the interview progressed. The set questions had similar elements between the different participants, however in some cases additional questions were added in order to gain the expert knowledge of the specific interviewee. Expert interviews can provide additional information that can be a good complement to existing articles and literature (Flick, 2022). Semi-structured interviews are the preferred framework for interviews in exploratory reports. They allow the authors to plan questions to fill in any gaps in the literature as well as delve deeper into the interviewee's expert knowledge by posing pertinent follow-up questions (Hennink, Hutter, and Bailey, 2020).

The selection of interview subjects was not pre-determined but rather expanded during the research process based on recommendations provided by the interviewees. This approach allowed for the identification of the most suitable candidates with relevant expertise for the study's specific subject. By using a snowball sampling method, a network of interviewees was established. Additionally, the interviews led to the sharing of additional knowledge sources in the form of websites and articles. As a result, a portion of the empirical data was obtained from sources either provided during the interviews or related to them.

4.2.2 Secondary data sources

The collection of secondary data was carried out through the analysis of two case studies conducted by STP. The selection of these particular cases was not based on a specific criterion but rather on their availability. These case studies were performed after the request from shippers who were seeking guidance on how to source more sustainable solutions. Both case companies were large global shippers with no prior experience in sustainable road freight procurement. They enlisted STP's expertise to understand how to transition to sustainable transport solutions and modify their internal procurement processes accordingly. The two cases had similar constraints regarding pick-up and delivery flexibility. Further, the product characteristics in the cases were also of similar character as they were fragile, required refrigeration and similar in size.

4.3 Selection of interviewees

The interviewees were chosen from three categories of stakeholders: Employees at STP, Transport buyers and a Researcher. An overview of the interviews and their main focus can be seen in Table 1.

4.3.1 STP

The main pool of interview candidates was employees at STP. The interviews were conducted with members of different departments and in that way a broad knowledge could be obtained. The departments that were interviewed were the sales department, the marketing department, the sustainability department and the legal department. As previously mentioned, the candidates were not predetermined. Instead, the interview process started with a few names of possible candidates and then through the interviews new candidates were found. All interviewees had previous knowledge of the subject.

4.3.2 Transport buyers

The transport buyers were chosen in such a way that they would differ from one another in some way to get a broader scope on the collected data. To determine differences the type of goods was considered. Their different needs made it possible to observe a wide variety of transport solutions as well as criteria that made each company's transport procurement needs unique.

Supply chain supervisor at the Furniture company

The Furniture company has multiple stores all over Sweden and sell their products both in store and online. They are a well-known brand and a large actor in the furniture market. They have multiple production sites in Sweden and try to procure environmentally friendly raw material whenever possible. Their goods are both large and bulky, making it hard to utilize the full capacity of a truck. They do not procure any sustainable transport today as they believe there is a lack of availability.

Head of commercial logistics at the Beverage company

The Beverage company has multiple well-known products on the Swedish market. They have large seasonal fluctuations in demand, hence their need for transport varies throughout the year. Their products are heavy which can make it hard to utilize the full volume of a truck. They have made some decisions in their transport procurement process to procure more sustainable transport solutions and are open to a larger change moving forward.

Head of supply chain and logistics at the Commodity company

The Commodity company has stores all around Sweden and is a well-known low-cost store. The company focuses on providing commodities at low prices. They have some seasonality between their stores and therefore need to adapt to the delivery of goods accordingly. Due to their low-cost brand, they have small price margins and try to cut costs wherever they can. Hence, they have not focused any efforts on more sustainable transport today. However, the head of supply chain is enthusiastic about a change towards more sustainable transport alternatives and works internally to make a change happen.

4.3.3 Researcher

To get a better understanding of academia's view on the subject a researcher at Chalmers was chosen and interviewed. The researcher was chosen due to his expert knowledge within the field. The researcher has studied the subject for many years and since 2012 the researcher has been a part of Transportinköpspanelen (the transport procurement panel) that has mapped shippers' behaviors over the years with multiple field studies and surveys.

Table 1: Summary of the interviews

Role/Department	Focus of the interview	Number of interviewees
STP		
Sales department	The tendering process today and what challenges they are facing	9
Marketing department	The mindset of the customers in relation to the tendering process	1
Sustainability department	How sustainability influences the procurement of transport solutions	2
Legal department	Regulations that influence the tendering of transport solutions	1
Transport buyer		
Supply chain supervisor at the Furniture company	The tendering process they use today as well as their mindset on incorporating sustainability in their transport solutions	1
Head of commercial logistics at the Beverage company	The tendering process they use today as well as their mindset on incorporating sustainability in their transport solutions	1
Head of supply chain and logistics at the Commodity company	The tendering process they use today as well as their mindset on incorporating sustainability in their transport solutions	1
Researcher		
Researcher at Chalmers	The tendering process today and predictions on what the future transport market will look like.	1

4.4 Data analysis

To sort and analyze the data multiple steps were performed. Firstly, the interviews were recorded and later transcribed to ensure that all the information was correctly noted. While the interviews were being conducted notes were taken. Directly after each interview the main points were summarized in an excel file to map out the key points. Quotes that were thought to be useful were also noted in excel. Once all interviews were completed and transcribed the raw data was summarized in Chapter 5.

Once the data was collected, two methodologies were used to analyze the data. The goal of using numerous methodologies is to increase the study's validity and combine the outcomes of the various approaches (Bryman and Bell, 2017). First a gap analysis was performed followed by a workshop.

4.4.1 Gap analysis

From the information gathered during the data collection a gap analysis was performed. Firstly, the current and future state was defined. Secondly, differences between them were identified and gaps were formed. The gap analysis was then used to structure the workshop.

4.4.2 Workshop

After the gap analysis was completed, the results were further refined and validated through a workshop. The workshop was conducted with a group of six STP employees, comprising individuals from various departments, some of whom had also participated in the interview study. To facilitate a seamless and efficient workflow, the workshop utilized an online whiteboard tool called Miro.

The workshop started with a short introduction of the thesis as well as key findings from the interviews and the gap analysis.

The workshop was divided into three phases. Firstly, the gaps were evaluated. This was done individually, and each participant was instructed to consider the gaps. The participants were asked to add additional aspects that should be considered within the same area if they found it relevant. By doing this, the gaps found during the gap analysis could be evaluated and tested, and new gaps could be found.

The second phase was to identify solutions to the gaps. The participants were divided into two groups with three participants in each. Each group delt with two or three gaps. The groups had 20 minutes to brainstorm solutions to the gaps as well as actions and/or criteria to measure each solution. Once all groups finished, each group presented and discussed their findings. During the discussions notes were taken to get a full understanding of the reasoning behind the arguments.

The third phase consisted of evaluation and prioritization of the identified solutions. Each group sorted all the solutions in the evaluation matrix according to their importance as well as their ease of implementation. Both groups' matrixes were presented and compared, the reasoning behind decisions was noted. The two groups' answers were then clustered into a combined matrix showing the median placement of both groups.

4.5 Trustworthiness

To ensure trustworthiness in the thesis the four pillars of trustworthiness described by Stahl and King (2020) have been considered. The first pillar is credibility. The authors describe credibility as highly subjective and dependent on the reader's perception. However, they mean that the credibility of research could be improved using triangulation. Methodological triangulation is the use of multiple methods to collect and analyze data. This thesis uses one main source of data collection which is interviews as well as two main methods of analysis, a gap analysis and a workshop, following the guidelines of triangulation according to Stahl and King (2020). The combination of these methods provided a well-developed conclusion as multiple perspectives could be taken into consideration.

The second pillar of trustworthiness according to Stahl and King (2020) is transferability. Transferability refers to the research ability to be transferred to other contexts. The research in this thesis is developed for road freight transport solutions. However, the model is not limited to road freight and can be used for other modes of transport as well. The research can therefore be considered transferable.

The third pillar described by Stahl and King (2020) is dependability. Dependability refers to researchers developing their trust over time by being consistent in their qualitative research. The interviews were recorded and transcribed to ensure the dependability of the data.

The last pillar described is confirmability. This pillar is circumstantial, having one's research audited is not always applicable according to Stahl and King (2020). In this thesis the process has been designed to aid confirmability. The interviews were recorded to enable confirmability of the information. The workshop was designed to confirm the analysis made from the data. The use of multiple interviewees with different perspectives made it possible to confirm the data from previous interviews.

5 Empirical data

This section presents the data collected from the different sources. The section is divided into five subsections and in each subsection, perspectives are given from STP, the Transport buyers and the Researcher.

5.1 The tendering process from different perspectives

This section presents the viewpoints of STP, the Transport buyers and the Researcher, regarding the tendering process for road freight transport.

In this section the tendering process is described by multiple actors. It is important to note that there is no official tendering process used by everyone, but instead each shipper can choose to procure transport solutions however they like. When "The tendering process" is mentioned in this section it refers to the general concept of a tendering process, the process of which a shipper chooses to procure their transport solutions.

5.1.1 The perspective of STP

The tendering process that is used on the market today is fossil oriented according to employees at STP. The process provides all transport solutions with an equal chance of competing against each other. However, in reality, sustainable fuels have a harder time winning the tendering contracts. This is mainly since the used Key Performance Indicators (KPI's) are designed for fossil vehicles. The tendering is structured around a set of lanes where the shippers need goods transported. As of today, these lanes do not take, for example, charging possibilities into consideration. However, gas stations are well stationed everywhere, hence, the KPI's are better adapted to fossil vehicles since they do not have to take other parameters into consideration. STP says that the process today is standardized by utilizing generic RFIs and RFQs. The tendering process is widely used in the transport industry and is, according to STP, used by the shippers for many reasons. One of the reasons mentioned is that the tendering process has been used for an extended period of time and shippers are therefore used to this specific procedure. In addition, the tendering process enables shippers to compare different transport providers solutions and services, and ensure that the shippers find the best solution for them, as communicated by a representative from STP;

"The shippers want to test that they get the best possible solution."

Furthermore, a standardized tendering process can be used to ensure an unbiased choice, the supplier who best meets all of the criteria gets chosen with no regard to personal relationships. Tendering could also be used if the shipper already has a current transport provider relationship and wants to renew their contract by comparing them to other options. Even though there are many reasons for the shippers to keep using the current tendering process, STP has found that shippers are becoming more and more aware of the need for a change. This is since they are experiencing difficulty to compare transport solutions based on internal combustion engine vehicles to sustainable transport solutions in the tendering process, as stated by a sales director at STP;

“Shippers are more open to change and want to understand what adjustments need to be done to have a tender process that makes easier to procure green transport.”

There is a need for persuasion and education to change the tendering process towards more sustainable options. STP highlights the importance of talking to a sustainability advocate at the shipper to get the commitment needed for a change.

The tendering process is mainly price focused today according to STP. Reliability is also mentioned as a key criterion which is measured and taken into consideration in tendering contracts. This means that shippers expect deliveries on time and complete on all affected lanes. The chosen lanes which the tendering contract involves are usually hard to divide into shorter sections. STP describes the tendering process as price and lead time based and that it often is transactional, which means that the procurement consists of routine actions.

5.1.2 The transport buyers’ perspective

The Furniture company has a well-functioning and standardized tendering process which they are using today. They initiate their tendering process by contacting a few transport providers where they present their case and which restrictions are present in the specific lanes. This is followed by feedback from the transport providers who present their solution and how it can be adapted to fit the Furniture company’s requirements. This sometimes involves sending goods in custom made pallets which is beneficial since the goods, in many cases, are big and bulky resulting in difficulties to achieve full truck loads. The Furniture company is open to dividing the transport distances into shorter routes to get optimal solutions. They are, for example, looking at how they can optimize their last mile delivery as well as how to deliver to their stores. The Furniture company’s desire is to be in a partnership with the chosen transport provider and that the level of information sharing is high between the different parties, allowing for example, track and trace solutions which the furniture company can share with their customers.

The Beverage company does not have a standardized tendering process. Instead, they base their decisions on previous experience and the information that they have at hand. They start their tendering process by examining the different lanes and investigate how profitable they can be from a cost perspective. Despite price being an important factor, the Beverage company is constantly trying to get a solution that is as cost effective as possible while simultaneously being sustainable, which can be a challenge as head of commercial logistics says:

“It becomes a question of how much more we are willing to pay to get the transport more sustainable.”

Further, the Beverage company looks at the reliability of the service that the different transport providers offer as well as lead time and what load carriers are used. The load carriers are of importance as some of the goods must be refrigerated during transport whereas others are not allowed to freeze.

The length of the contracts varies for the Beverage company. The tendering process usually involves approximately two months of discussion to achieve an acceptable solution. Subsequently, new suppliers are offered a one-year contract, while suppliers with whom the Beverage company has established relationship with are typically offered contracts spanning multiple years. The Beverage company has experience with procuring sustainable transport solutions, HVO fueled vehicles, for some of their lanes to achieve their internal environmental goals.

The Commodity company sees change in the transport providers from year to year, hence their way of handling transport is flexible and ever changing. They have decided to only work with transport providers who work with developing their vehicle fleet to become more sustainable, and who constantly educate their employees as stated by head of supply chain and logistics at the Commodity company:

“We really value working with transport providers who think that it’s extremely important to constantly improve their sustainability work.”

This mindset of the Commodity company is resulting in fewer contracts with smaller carriers that do not offer sustainable transport options. Hence, they perform tender processes yearly to get a good overview of the market. In the tendering process the Commodity company invites 12 haulage companies to bid on the different lanes between their 90 stores and warehouses. Once the Commodity company has gathered information from the carriers, they add it to a matrix which they build a model upon. They mainly look at price and try to find a transport infrastructure where the trucks are running with full truck loads to the highest extent possible. This is beneficial for pressing the prices but also for minimizing emissions per product. To achieve full truck loads over the entire year, the Commodity company has adapted their transport schedule based on seasons as they have seen that certain areas do not require frequent deliveries during specific months. To lower the price even further, mathematical calculations based on e.g., distances have been carried out and applied in the tendering process to achieve the lowest possible cost per kilometer. Despite tendering once a year the commodity company prefers not to switch between different transport providers regularly.

The Commodity company is not flexible when it comes to their delivery schedule as they are working with just-in-time deliveries to meet customer demands, which means that they follow the sales curve of the stores. A further reason for limited flexibility is the capacity of the warehouse. As the company is a low-cost retailer it is of great importance to not have too many overhead costs on each product.

5.1.3 The Researcher’s perspective

The tendering process for transport can look different depending on what is being bought and how big the company is according to the Researcher. In some cases, there could be hundreds of transport providers bidding on the relevant lanes which will influence the process. Further, the process will be influenced by which customers the shippers have and what expectations they have on the delivery schedules. The Researcher argues that transport procurement does not start with the person who buys transport, but with the person who needs something transported between two locations. However, the first step, according to the Researcher, is to get an understanding of how the flows are currently structured. After mapping the flows, an RFI is sent out to the transport providers and a requirement specification is set. By determining certain in-house criteria, the company can control which contractors meet the basic requirements.

According to the Researcher, more and more companies add an environmental aspect to their requirements to be able to compare different transport providers on other criteria besides price. However, even if it is more common to see environmental criteria now than it was a few years ago, still few shippers incorporate it in their tendering process. A more common criterion measured in the tendering process is the quality and reliability of the transport solution.

Following the RFI, an RFQ is sent out. The level of discussion this brings depends on the complexity of the contract and what shippers and transport providers are involved. In some cases, a transport provider with desirable features but not the best solution for the contract is found. In other cases, the price is too high. If the transport provider offers a solution where some aspects are not ideal, the shipper can choose to repeat parts of the tendering process to achieve a desirable state. This means, according to the Researcher, that the tendering process could be an iterative process. The outcome of the tendering process could also be changed by keeping a dialog with the transport providers to come to a level of agreement. A potential outcome of a too complex or iterative process is the risk of losing interesting transport providers, as it becomes too time-consuming. However, it is important to keep in mind that the tendering process could be initiated with no intent of changing the current transport providers, but simply putting pressure on them.

As mentioned, studies carried out by the Researcher have shown that price is highlighted as the most important factor to the shippers in the tendering process. However, price is less important when it comes to innovation and especially when the cost is connected to environmental benefits. According to the Researcher, there will soon not be a choice whether to choose sustainable transport options or not. Hence, to stay successful it is of great importance that companies put themselves at the forefront of sustainable innovation, even if it does not bring immediate profitability. Nevertheless, actors in the industry still believe that questions regarding sustainability should be handled separately from the tendering process. The Researcher argues for a common effort in order to achieve a noticeable effect on the environment.

5.2 Difference between tendering electric versus fossil transport

From the interviews with STP as well as from the case studies provided by STP, it was found that there are differences between tendering electric transport solutions and tendering fossil transport solution. The differences are presented in this section.

5.2.1 The perspective of STP

STP argues that there are differences between tendering electric transport solutions versus tendering fossil transport solution. These differences need to be accounted for if the shipper wants to tender sustainable transport.

One difference between tendering electric transport and fossil transport is the need for efficiency in the transport flow to ensure minimum idle time. This is due to the high investment costs for electric transport solutions. Hence, STP highlights the importance of looking at the total cost of ownership (TCO) when regarding electric transport solutions. Even though the investment cost for electric solutions is larger than fossil solutions the operational cost has in the past been significantly lower. By performing a TCO analysis a break point can be found where the larger investment for the electric transport solution pays off over time. To ensure efficiency and high utilization the total scope of the electric transport solution must be considered. Hence, an acceptance from the shippers of flexibility in processes and operations is vital to make sure that, for example, delivery schedules can align.

Moreover, when procuring electric transport solutions, the charging infrastructure must be developed along the tendered lanes, which is not the case for fossil transport solutions where the infrastructure with gas stations is already in place. To build the charging infrastructure in an optimal way multiple factors need to be considered. The complexity of space and grid capacity requires additional resources according to STP.

Another difference found is the implementation lead time between electric transport solutions and fossil transport solutions. Currently, electric transport solutions have a longer implementation lead time compared to fossil transport solutions which can be retrieved momentarily, since no prerequisites are required for a fossil transport solution to function. For example, a fossil transport solution does not require extensive planning of where to fill up with gas since the fuel infrastructure is well developed. An electric transport solution on the other hand requires a plan to function as the charging infrastructure is not as well developed. STP points out that this requires a higher level of flexibility and foresight when tendering electric transport solutions.

Another difference found by STP is the contract duration. Due to high investment costs for electric transport solutions, there is a need for longer contract times. Transport service contracts today are usually about one year. According to STP, electric transport solution contracts need to be longer to be profitable. As the investment for electric transport solutions is higher than fossil transport solutions, the capital investment must be split over a longer period as seen in a TCO analysis. When tendering fossil transport solutions, contracts can be shorter due to lower investment costs, hence the tendering process is usually carried out more frequently for fossil transport solutions.

Furthermore, a difference between tendering electric transport solutions and fossil transport solutions is the current procurement process. STP has seen that companies prefer to have a standardized way of tendering. The process used today leaves little room for communication of the offer, which is needed when providing a new solution. When the process is standardized, it becomes more difficult to innovate an offer, which is what electric transport solutions are trying to do. Therefore, fossil transport solutions have an easier time expressing their offer in the current process.

Lastly, when tendering electric transport solutions, it is important to understand that an electric transport solution is more complex than a fossil transport solution. More parameters need to be considered (e.g., charging time, etc.) and a larger amount of data needs to be handled according to STP. This data could be regarding external circumstances such as weather which affects the performance of the battery. Hence, a centralized and digitalized system is recommended.

5.2.2 Findings from the cases

Data was gathered from two different cases provided from the interviews with STP, Case 1 and Case 2, which are presented below.

Case 1

Three conclusions from Case 1 are found to be relevant to the study. Firstly, the case shows that there is a difference in the needed timeline regarding RFQs for tendering fossil transport solutions and tendering electric transport solutions. Due to the complexity of electric transport solutions, electric transport solution providers require longer time during the RFQ to construct a fully functioning solution, including both vehicle and required charging infrastructure.

Secondly, Case 1 concludes that there is a lack of charging infrastructure. To develop the infrastructure a certain level of information sharing is required between the shipper and the transport provider. The required information could regard prerequisites to enable charging.

Lastly, findings from Case 1 highlight the need for longer contract times when tendering electric transport solutions. This is a result of the high investment cost in the hardware for electric vehicles. As explained previously, the TCO of an electric vehicle benefit from longer contract times.

Case 2

In Case 2 three different aspects were brought up which should be taken into consideration when tendering electric transport solutions in comparison to tendering fossil transport solutions. The first one is that sustainable transport tendering could benefit from, and include, a more extensive supplier qualification process consisting of questions such as:

- What is the transport provider’s current CO_2-emission reduction targets?
    - How does the transport provider plan to achieve these targets?
- What is the transport provider's current sustainable transport capabilities/offerings?
- How many years of experience does the transport provider have within sustainable transport?

The second aspect to be considered when tendering electric transport solutions is the transport service offered, which can differ from fossil vehicles. Questions to be included in the tendering could for example be:

- What components are included in the transport provider’s sustainable transport solution?
- What lanes does the transport provider think are suitable to electrify in the short term?
- What Service Level Agreement’s and KPI’s does the transport provider think are suitable for sustainable transport?

Lastly, in Case 2 STP recommends looking at the supplier's long-term ambition for sustainable transport as well as how the transport can be transformed and scaled up into a fully sustainable solution.

5.3 Incorporation of sustainability in tendering

In the interviews STP, the Researcher and the transport buying companies have given their view on how sustainability is incorporated in the tendering process today which is presented in this section.

5.3.1 The perspective of STP

According to STP very few shippers incorporate sustainability in their tendering process today, choosing to only focus on reliability and price. In some cases, STP has seen sustainable criteria, e.g., “price for sustainable option”, but these are usually non-specific, and the prioritization is usually low or unclear. Shippers could use this approach as an easy way out, they open for the possibility of a sustainable option but can easily dismiss it if it interferes with other criteria. The sustainable transport market is in its early stages, hence there are more factors at play than for traditional transport. Sustainable transport solutions are not just about the vehicle itself, other aspects such as route optimization and load efficiency are also important to consider according to STP.

STP has found that a pre-study of the shipper's situation can be beneficial for the shipper to ease the implementation of sustainable transport solutions. STP believes that this type of pre-study is an important step in all shippers' sustainability journey and that all shippers will need to do a pre-study at least once. STP believes this process will become less time-consuming once the sustainable transport market has matured and a functioning infrastructure is in place.

5.3.2 The transport buyers’ perspective

The Furniture company focuses their sustainable efforts on their products. Their aim is to procure materials that are marked with the Swedish ecolabel "Svanenmärkt" or are locally produced. Their main reason for not using sustainable transport today is the lack of sustainable transport providers and sustainable fuel infrastructure. The big and bulky nature of their products poses a challenge in achieving optimal use of the truck's total volume capacity, thereby hindering their efforts to attain sustainable transport solutions. Nonetheless, sustainability ranks among their highest priorities, and the procurement team is committed to this objective. Hence, they are confident that they will adopt a sustainable transport system once a viable solution becomes available.

The Beverage company has incorporated sustainability by choosing HVO for their outbound deliveries in Sweden. HVO was a more expensive fuel option than fossil, but they chose it to lower their emissions. The Beverage company also focuses on actions to compensate for the CO_2 they release, since this is considered a cheaper option than changing all their lanes to a more sustainable transport solution. They have investigated other sustainability options, such as electric transport solutions, but due to their products' seasonal dependencies, they have not yet found a solution that gives them a reasonable price year-round. The Beverage company thinks that their urban transport will be the first to change to an electric transport solution.

The Commodity company works with a small margin and since transport is considered a non-value adding activity it has been procured based on price in the past. However, they see opportunities with becoming more sustainable today. They have therefore started to investigate their lanes and approached an alternative transport provider with sustainable options. The Commodity company believes that for sustainable transport solutions to be profitable all shippers must participate and collaborate in the change. By collaboration with nearby companies, the Commodity company thinks that infrastructural investments and load efficiency could be improved.

5.3.3 A researcher’s perspective

One way that companies measure sustainability today is by doing cost analysis of CO_2 emissions, according to the Researcher. These models are usually not public but developed and used within each company. However, the most important aspect for the customers is price.

One way to incorporate sustainable aspects in the tendering process is to add new fixed and standardized evaluation criteria to make suppliers more comparable. One way of applying this could be to demand only fossil-free or fossil neutral transport solutions in the first step of the tendering process. If transport providers cannot comply with such expectations, they are immediately eliminated from the process. Another way to decide the evaluation criteria is by cooperation. According to the Researcher, the “linear process” where the shipper sets the expectations on the transport provider should evolve to a partnership, where the actors can collaborate and coordinate with each other. The tendering process should be seen as a two-way relationship working together to find the optimal solution. Hence, the shippers and the transport providers must come up with new criteria for the tendering process together according to the Researcher.

5.4 The shipper's mindset

STP, the Researcher and the transport buyers have given their view on how the mindset of shippers affects the tendering process, which is presented in this section.

5.4.1 The perspective of STP

The mindset of the shippers today varies. Sustainability is on the agenda for all companies and STP believes that the majority of the shippers want to change their transport solution to a more sustainable offer. However, depending on who you talk to at the shipper this can vary. STP has found that if they find someone at the shipper who can work as a sustainability ambassador, the shipper is more open to choose a sustainable alternative. Hence, personal interest has been seen to influence the decision, and the higher position this person has the more weight the influence has.

STP has over the last couple of years seen an increase in the shippers' willingness to change. Companies' internal sustainability goals are getting closer to their due date, putting pressure on a change to happen. STP has noticed that more and more shippers are asking them for help to understand how they can tender more sustainable transport solutions. In multiple cases they have had early on collaboration with the shipper and educated them in what they should consider when tendering sustainable transport solutions.

Moreover, STP emphasizes that price and reliability are still the most important factors for the shippers and that more shippers need to understand that a change soon needs to be made. Today the shippers are focused on the cost of change, but STP means that more needs to realize the cost of not changing to a sustainable transport solution.

5.4.2 The transport buyers' perspective

As mentioned before, the Furniture company wants to change but is not ready to put in the resources that a change requires. They don't feel like there are any options available for them on the sustainable transport market today and await infrastructural development before changing transport solution.

The Beverage company's mindset on sustainability is centered around economic aspects. They think sustainability is an important subject, but their choices are measured around economics. They choose a slightly more expensive fuel option, HVO, to reduce their emissions on some of their routes. At the same time, they admit that as long as it is cheaper for them to compensate for their emissions than reducing them, it is going to be the viable option for them.

The Commodity company has a positive mindset towards sustainable transport solutions and is willing to change. They are working towards finding solutions that are possible for them to implement and are investigating ways to make the shift cheaper than it is today.

5.4.3 The Researcher's perspective

The Researcher believes that more shippers need to realize that a change soon needs to happen. In order to reach the 2030 goal, the shippers need to start changing their way of thinking. The researcher points out that soon a change won't be an option but a governmental requirement, and when that time comes the shippers will not benefit from being last.

5.5 Laws and regulations

According to STP, already existing or future regulations, which are limiting or controlling the way organizations deal with their emissions, may influence the way transport tendering processes are structured in the future. Below are some regulations which have an influence on the transport sector.

5.5.1 The EU Taxonomy

The EU Taxonomy is a green grading system that converts the climate and environmental goals of EU into standards for certain economic activity for the purpose of investment. The EU Taxonomy recognizes economic activities as "green," or "environmentally sustainable," if they comply with at least one of the EU's climatic and environmental goals, while also posing minimal social obligations and not materially impairing any of the remaining goals. Sectors such as transport, manufacturing, energy, buildings and forestry are included in the delegated act under the EU Taxonomy (European Commission, 2023a).

The Taxonomy Delegated Actions will create and uphold precise standards for actions that specify what constitutes a large contribution and what constitutes no considerable harm. It is a transparency mechanism that will impose strict disclosure requirements on selected businesses and investors, obliging them to reveal their proportionate involvement in Taxonomy-aligned activities. The EU Taxonomy creates a tool to aid the transition to a sustainable economy as well as climate neutrality by establishing a shared vocabulary for green activities. Companies will be supported through financial aid in their transition to become more sustainable while the EU Taxonomy simultaneously will protect against greenwashing (European Commission, 2023a).

Comparing businesses and investment portfolios will be possible thanks to this disclosure of the percentage of activities that adhere to taxonomies. Further, it can direct market players' investment choices. If they choose, businesses can dependably plan their climate and environmental transition and collect money for this transition using the EU Taxonomy. If they so choose, financial institutions can create reliable green financial products using the EU Taxonomy. However, investors are not required to participate in any of the economic activities on the EU Taxonomy's list. Yet, it does not impose any restrictions on businesses or financial products' environmental performance. What an investor invests in is entirely up to them. Even though it is not required of businesses to make sure their economic activities adhere to the Taxonomy's standards, it encourages them to work toward achieving an environmental performance standard that the financial markets recognize as green. The EU Taxonomy is anticipated to facilitate transformation and promote a shift toward sustainability over time (European Commission, 2023a).

For an economic activity within a company to be environmentally sustainable, it must be Taxonomy aligned. Hence, the Taxonomy Regulation establishes four conditions which must be met. The first technical screening criteria is that the economic activity that a company carries out must make a significant addition to a minimum of one environmental objective. This technical screening criteria ensures that economic activity either has a significant positive environmental impact or significantly lessens negative environmental effects, e.g., reduction of greenhouse gas emissions. The environmental objectives are (European Commission, 2023a):

- Climate change mitigation
- Climate change adaptation
- Sustainable use and protection of water and marine resources
- Transition to a circular economy
- Pollution prevention and control
- Protection and restoration of biodiversity and ecosystems

The second criteria that needs to be met is that the economic activity must not do any substantial harm to any other environmental objective, meaning that it does not hinder other objectives from being reached. Further, it must adhere to minimal social safeguards as well as comply with the technical screening criteria (European Commission, 2023a).

5.5.2 Scope 3 emissions

The International Sustainability Standards Board (ISSB) of the International Financial Reporting Standards (IFRS) has announced the implementation of new disclosure standards applicable for private companies in relation to greenhouse gas emissions. The standard is predicted to be published in 2023 and will require companies to track their scope 3 emissions and involve them in their greenhouse gas reporting (OBeirne, 2022).

Scope 3 emissions, also known as “value-chain emissions”, are emissions which originate from activities outside the scope of the reporting organization. These could be indirect emissions, both upstream and downstream in the company, from, for example, waste generated in fuel and energy related activities or transport and distribution. The indirect emissions often represent the largest part of an organization’s emissions. By making it mandatory to keep track of the scope 3 emissions it becomes vital for organizations to keep track of all interactions along the value chain (Wittevrongel, 2022).

5.5.3 Emissions cap

To reach the target of minimum 55% net reduction in emissions of greenhouse gases by 2030, an emissions cap and allowance has been implemented by the European Commission. This means that a ‘cap’ on the total volume of emitted greenhouse gases by power plants, industry factories and the aviation sector has been set. Hence, the total amount of emitted greenhouse gases is limited. Companies can then trade emission allowance as they need between each other. The goal of this legislative proposal is to lower the total emissions over time as the cap decreases yearly (European Commission, 2023b).

5.5.4 Sweden’s carbon tax

In 1991 a carbon tax was implemented in Sweden which has been developed over time. It is a way to ensure that those who cause the pollution pay for it and that the most cost-effective way is used to lower the emissions. The carbon tax aids the growth of new, more sustainable innovations and technologies. Moreover, it creates incentives for energy consumption reduction as well as making it more beneficial to use renewable energy solutions. The carbon tax has increased over the years, allowing both households and organizations to adapt to the additional cost of emitting carbon (Government Offices of Sweden).

6 Analysis

This section analyses the empirical data and answers the four guiding questions developed in the framework. To answer GQ1 a gap analysis has been performed. The gap analysis lays the foundation for the workshop. The workshop used the evaluation matrix and provided three conclusions. Each conclusion answered one of the remaining guiding questions, GQ2, GQ3 or GQ4.

6.1 Gap analysis

A gap analysis has been completed based on the collected data. The current and future state were defined resulting in the finding of four gaps that showcase the difference between tendering sustainable transport solutions and fossil transport solutions, providing an answer to GQ1: How does tendering sustainable transport solutions differ from tendering fossil transport solutions?

6.1.1 Current state

The transport sector has for many years been dominated by fossil transport solutions. Recently, innovation of new and sustainable transport solutions has emerged, resulting in the need for a new view on the tendering process. Through the data collection it has become evident that the tendering process has, over the years, been adapted to support tendering of fossil transport solutions. Hence, the tendering process of road transport solutions is fossil oriented today, making it more difficult for sustainable transport solutions to win contracts. Further, the data collection showed that sustainability is not the first priority for the shippers. Today, the negotiation and contracts are centered around price and reliability where sustainability is considered last, making it hard for sustainable transport solutions to compete.

6.1.2 Future state

The future state of the transport tendering process enables equal grounds for tendering all transport solutions. To ease the comparison of fossil and sustainable transport solutions, and to influence the shipper's mindset, a clear measuring criterion for sustainability should be incorporated into tendering. The reformed tendering process will improve the role of sustainability within transport tendering.

6.1.3 Gaps

To answer GQ1, the empirical data was analyzed and differences between the current state and the future state were found. These differences could be categorized into four gaps.

Gap 1: Lack of fuel infrastructure

The first gap that was identified was the lack of fuel infrastructure. Today, the fuel infrastructure along roads and highways is centered around fossil transport. Hence, when procuring non-fossil transport services, a functioning infrastructure needs to be identified and developed. This increases the cost of the tender as the cost of constructing fuel stations is added to enable a fully functioning solution. Moreover, the lack of fuel infrastructure extends the lead time since time must be spent on building fuel stations along the lanes. The transport buyers interviewed found this to be one of the main hindrances to changing to sustainable transport solutions and were more inclined to make a switch if an infrastructure was in place. The transport buyers also expressed a wish for collaboration with their neighbors in the development of fuel infrastructure. If shippers close to each other or with the same shipping destination collaborated the investment cost could be split. A collaboration could allow companies to split the cost of implementing a fuel infrastructure, making it possible to lower the cost for each shipper.

Gap 2: Different cost structures

The second gap that could be identified from the collected data was the difference in the cost structure between fossil transport solutions and sustainable transport solutions. For example, today an electric vehicle is more expensive than a fossil fueled vehicle. The expensive vehicle investment results in an increased cost of the transport solution. However, the cost curve of the two options intersects over time, allowing electric solutions to become the cheaper option if enough time is given, since the price for electricity is usually lower than the price for fossil fuel. Today the process is adapted to fossil transport solutions since the tenders are usually carried out annually.

Gap 3: Different lead time

The third identified gap was the difference in implementation lead time between sustainable transport solutions and fossil fueled transport solutions. Tenders for transport solutions based on fossil fuels can usually be implemented immediately since vehicles and the corresponding infrastructure are already in place. However, when procuring a sustainable transport solution, the implementation time is usually longer since the required fuel infrastructure is not in place if the route is new. The implementation lead time for sustainable transport solutions is also affected by the lead time from the vehicle manufacturers.

Gap 4: Knowledge

The fourth gap that was identified was the mindset of the shippers today. Some of the shippers' internal policies and systems were in some cases a hindrance to change. For example, the digital process used by shippers could, in some cases, not process all input data which some sustainable transport solutions require, making it hard to switch from fossil transport solutions. Lack of knowledge and motivation to change have made transport buyers stuck in the processes they use today.

6.2 Analysis of the workshop

To validate the answers to GQ1 and to find solutions to the identified gaps which consequently provide answers to GQ2, GQ3 and GQ4, a workshop was conducted. The workshop found an additional gap and provided solutions to all five gaps. The solutions were then evaluated in an evaluation matrix and three conclusions could be drawn. These conclusions provide answers to GQ2, GQ3 and GQ4.

6.2.1 Evaluation of the gaps

During the workshop, participants confirmed and acknowledged the previously identified gaps. The first phase of the workshop involved participants brainstorming and proposing additional gaps. The findings from this phase were aligned with the four previously identified gaps, as many of the participants identified the same gaps using different wording. For example, some participants identified "contract terms not feasible for electric" and "contract structure not suited for electric," which could be linked to *Different cost structures* and thus fall under Gap 2. Another example from a workshop participant is "timelines," which could be grouped with D*ifference in lead time* and classified as part of Gap 3.

During the workshop, one of the identified gaps, Gap 4, which pertains to the lack of knowledge, was further developed. Participants identified that the reason for this gap is a lack of understanding about the implications of shifting from fossil transport solutions to sustainable transport solutions. To enable a more comprehensive discussion, the scope of gap 4 was broadened to encompass the notion that shippers are stuck in a process and lack knowledge regarding the transition to sustainable transport solutions.

During the workshop, an additional gap was identified and examined by the participants. After some discussion, the gap was identified as Gap 5: *Sustainability strategy in logistics*. While companies often have a sustainability strategy in place, in many cases, the focus is placed on areas other than transport, which allows non-sustainable options to thrive in the logistics sector. The participants believed that closing Gap 5 would be instrumental in achieving the future state as it would add more internal pressure on shippers. The completed gap analysis is summarized in Figure 7.

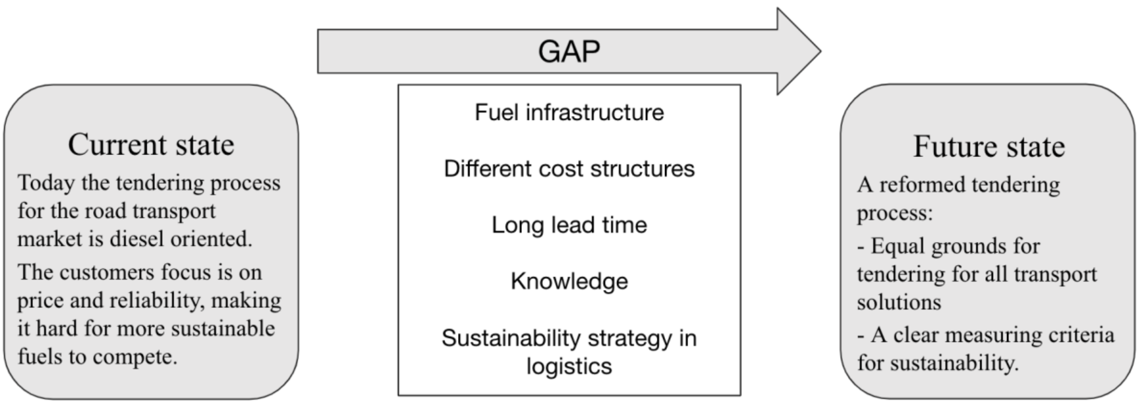

Figure 7: Gap analysis

6.2.2. Suggestions of solutions to the gaps

The workshop provided several suggestions of solutions to each gap. The solutions have been developed and each solution has been given a description which can be found in Table 2.

Table 2: Solutions to gaps

Solutions	Description
Gap 1- Fuel infrastructure	
1.1 Share prerequisites	The shippers should share with the transport provider what conditions they have regarding sustainable fuel infrastructure at their facilities. If the shipper already has some installations available, the lead time between tender and implementation could be shortened. If no fuel infrastructure is in place along the routes the shipper wishes to use the fuel infrastructure needs to be developed. Other prerequisites are also found important for the shipper to share with the transport provider e.g., sustainable energy sources at the site such as solar panels on the roof.
1.2 Infrastructure investments	In the case where shippers make their own investments in sustainable fuel infrastructure, the implementation lead time could potentially be shortened due to the readiness of the fuel infrastructure as no development is required. The price of the offer could also be affected due to the same reason. Hence, the shipper should consider their sustainable fuel infrastructure when they plan their facilities.
1.3 Holistic approach	A holistic approach decreases the complexity for the shipper. If the transport provider considers all parameters related to the shipper's transport solution a custom-made solution can be found. This is not to be done lane by lane but instead for larger scopes. With a holistic approach, the shipper could benefit by establishing a closer relationship with the transport provider and thereby simplify the implementation further.
Gap 2- Different cost structures	
2.1 Increased flexibility and collaboration	A higher flexibility and increased collaboration between the shipper and the transport provider enable more efficient solutions and higher utilization of vehicles. The flexibility concerns i.e., operation hours, deadlines, drop-off/pick-up interval, routes etc. More parameters must be considered in sustainable transport solutions (e.g., charging for electric vehicles). Hence, high flexibility and collaboration can aid the alignment of all operations.
2.2 Longer contract times	Considering TCO, longer contracts could be a way to make the cost structure of sustainable transport solutions and fossil transport solutions comparable. To support the longer contract times, a partnership could be developed between

	the shipper and the transport provider. With a partnership, investments can be seen as part of a growth plan spreading the cost over time.
2.3 Foundation for sustainable solutions	The shipper can enable a change by preparing the foundations. As described in solution 1.2, having sustainable fuel infrastructure possibilities, or opportunities prepared, in the facilities (e.g., solar panels) could lower the cost of introducing a new solution.
2.4 Monetization of CO_2	To better compare the costs of different transport solutions a monetization of CO_2 can be made. The emissions saved by changing to a more sustainable transport solution can be compared with other actions to lower the company's environmental footprint, providing the shipper with a cost comparison of different sustainability actions.
2.5 Align budgets	If the shipper aligns their sustainability budget prior to initiating the transport tendering process, the cost could be divided between different departments. E.g., the resources to build fuel infrastructure could be part of the facility budget and not considered in the tender.
2.6 Comparing transport solutions over longer time periods	Comparing different solutions over a longer time period will allow the shipper to evaluate the tender offer with more information about future prices. This in turn can provide the shipper with insights into the cost of switching to a more sustainable transport solution now versus in a couple of years.
Gap 3- Different lead time	
3.1 Adjust foresight	By educating the shippers about the longer lead times between the tendering process and the implementation date, their foresight can be adjusted.
3.2 Interim solutions	The change to a more sustainable transport solution could be made easier by using interim solutions, i.e. the shipper can have short term solutions while stepwise implementing the main solution.
3.3 Educate about longer lead times	To minimize the consequences of a longer lead time, education could be provided for the shipper about the change and the need for longer contract times.
3.4 Separate tendering for sustainable transport solutions	One solution is to conduct a separate tendering process for sustainable transport solutions, rather than comparing them with fossil solutions in a single process. This would ensure that sustainable solutions are only compared to other sustainable options, enabling a fair evaluation of their capabilities and equal terms for the implementation lead time. The shipper could set a sustainability target for transport and procure

	it through a separate tendering process. This would provide a clearer picture of the sustainability performance of different solutions and allow for a more informed decision-making process.
Gap 4- Knowledge	
4.1 Motivate the shippers	Motivate the shippers to dare to change to a more sustainable transport solution by education. The transport providers can motivate the shippers by informing them about the perks of becoming more sustainable today and the drawbacks of falling behind.
4.2 Make education part of tendering	The shippers should be educated about the switch to more sustainable transport solutions. This will make it easier to compare solutions and will allow the shippers to take more informed decisions.
4.3 Emissions reduction KPIs	Develop and add sustainability KPIs in the tendering process to make it possible to measure the tendering process on something besides cost.
Gap 5- Sustainability strategy in logistics	
5.1 Scope 3 emissions reporting	The new regulations about scope 3 reporting need to be incorporated in the tendering process. This will aid the fulfillment of the regulations as well as provide the shipper with another selection criteria. The scope 3 reporting will also make it possible for shippers to track their sustainability progress and reach their internal goals.
5.2 Sustainability employee bonuses	Introducing an internal bonus system that is contingent on employees' environmental sustainability incentives can facilitate the integration of sustainability strategy into a company's logistics operations.
5.3 Include head of sustainability	Ensuring that sustainability is part of the dialog in tendering can help align internal processes and budgets.
5.4 Educate top management	Educating top management regarding sustainability aspects in logistics can expand the reach of this knowledge to a wider and more influential group within the shipper’s organization.

6.2.3 Prioritization of the gaps

The third phase of the workshop focused on prioritizing the identified solutions (Table 2) in an evaluation matrix based on the ease of implementation as well as how much impact they would have on the tendering process. The result is presented in Figure 8.

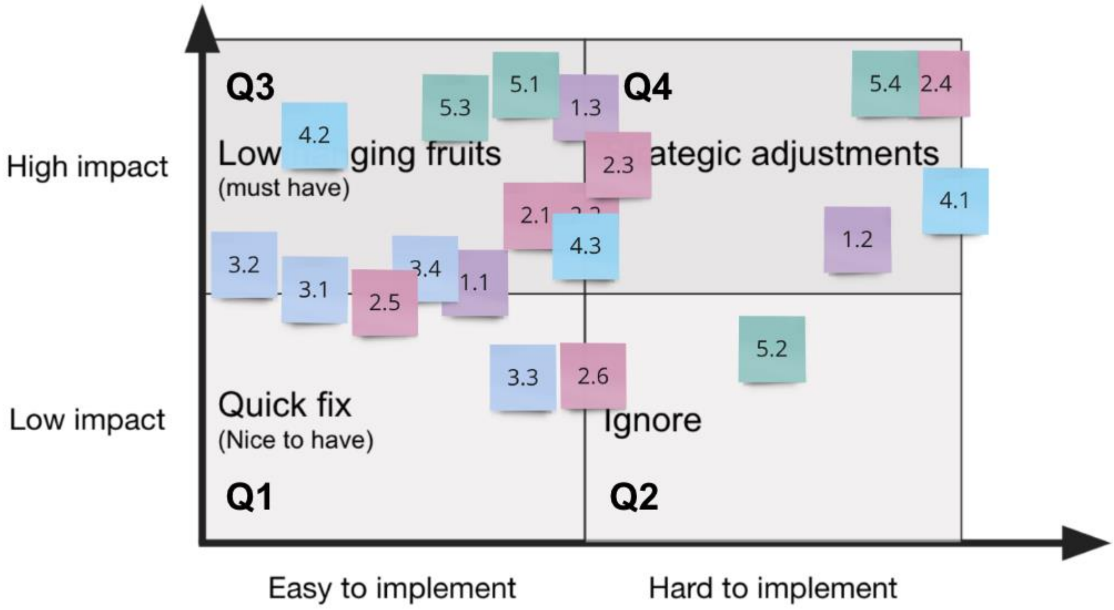

Figure 8: The evaluation matrix

Based on the analysis of the proposed solutions, the majority of the solutions were placed in Q3, indicating that they are viable and should be taken to the next step for implementation. However, only one solution, 5.2, was placed in Q2, which suggests that it may be more difficult to implement as it involves internal processes and is dependent on various factors. Nevertheless, it should not be dismissed entirely, but rather translated into knowledge that can be shared with the shippers to facilitate an informed and smoother internal change. Ultimately, the decision to implement this solution will be left to the shippers.

Four solutions were placed in Q4. Solutions 1.2, 4.1 and 5.4 all concern shipper involvement, and as explained above, the implementation requires interaction with the shipper. Hence, all of these could be translated into knowledge that the shippers should consider if they want to change their transport solution. This knowledge sharing could, for example, be to inform the shippers of the benefits of building their own fuel infrastructure before making the switch from fossil transport solutions to sustainable transport solutions. In this way the shippers could be influenced positively and take decisions internally which benefits sustainable transport solutions. The last solution that was rated difficult to implement but to have a high impact is 2.4. This solution is difficult to implement due to multiple factors. There is no general way to monetize CO_2, hence the comparability between different numbers can vary. Another factor which makes the solution hard to implement is the knowledge sharing required by the shipper, without transparency the calculations will be off. Even though it is difficult to fully implement this solution, it is considered of high importance in reaching the aim of this thesis.

6.2.4 Conclusion from the workshop

From the workshop three conclusions could be made. Firstly, there is a knowledge gap in the industry that results in decisions favoring fossil transport solutions. Secondly, it is currently difficult to make a fair comparison between sustainable transport solutions and fossil transport solutions. Thirdly, in some cases, sustainable transport solutions should be tendered separately rather than being included in the same process as fossil transport solutions. The three conclusions from the workshop provide answers to GQ2, GQ3 and GQ4. Each action is equally vital in achieving the goal of a reformed tendering process. Each conclusion is briefly presented below and further developed in chapter 6.3.

Knowledge exchange

As found both during the workshop and the data collection, there is a lack of knowledge concerning the switch from fossil based trasnport solutions in the road freight industry today. A common misperception is that the different transport solutions (fossil and sustainable) are interchangeable, leading to incorrect expectations. Hence, providing the shippers with a knowledge transfer could decrease this gap. This transfer could be divided into two parts. Firstly, one part that provides the shipper with knowledge about the change from fossil transport solutions to sustainable transport solutions. This part could include and cover the following solutions found in the workshop; 1.2, 2.1, 2.2, 2.3, 2.5, 3.1, 3.2, 3.3, 4.1, 4.2, 5.2, 5.3, 5.4.

The second part of the knowledge transfer is information transfer to the transport providers. The information transfer provides the shippers with guidelines on what information might be important for the shipper to share with the transport provider to ensure a smooth transition. This transfer covers the following solutions from the workshop; 1.1 and 2.1.

The solutions identified in this section provide an answer to GQ2: What do shippers need to consider when tendering sustainable transport solution?

Alternative measuring criteria

The tendering processes used today works well when tendering fossil transport solutions. However, by extending the measuring criteria the process could be better adapted for sustainable transport solutions and be able to compare all solutions. This would incorporate the following solutions from the workshop; 2.4, 2.6, 4.3, 5.1.

The solutions identified in this section provide an answer to GQ3: How can sustainability be measured in the tendering process?

Dedicated tendering process

The workshop revealed that separating the tendering process for sustainable transport solutions might be a more effective approach. To achieve this, shippers should determine in advance the percentage of their fleet that should be sustainable and establish a separate tender process for it. The Researcher also recommended this approach in section 5.3.3, where it was suggested that shippers could use RFIs to set clear demands and eliminate unsuitable transport providers early in the tendering process. A separate process could incorporate the following solutions from the workshop: 1.3, 2.1, 2.2, 3.4

The solutions identified in this section provide an answer to GQ4: How do sustainability aspects affect the relationship between shipper and transport provider?

7 Discussion

This section discusses the conclusions from the workshop which provides answers to the guiding questions.

7.1 Knowledge exchange

The first conclusion from the workshop provides an answer to GQ2, what shippers need to consider when tendering sustainable transport solutions. The workshop concluded that there is a knowledge gap between shippers and sustainable transport providers. To close the gap and to provide the shippers with what they need to consider when tendering sustainable transport solutions, a knowledge exchange is needed.

The goal of a knowledge exchange is to provide both parties with necessary information to ease and shorten the overall tendering process. As found during the workshop, the information needed varies between shippers and transport providers. As presented in section 6.2.4, there is a knowledge gap for shippers concerning the switch from procuring fossil transport solutions to procuring sustainable transport solutions. This gap is thought to be resolved if the right knowledge, as described below, is shared with the shippers. The knowledge would enable the shippers to educate themselves, allowing for a smoother transition to more sustainable transport solutions.

Moreover, the analysis has shown that there is an information gap between shippers and transport providers as well. The transport providers need information from the shippers to be able to develop optimized sustainable transport solutions.

To accommodate for both of these gaps, the knowledge exchange is divided into two sections. The first part consists of a knowledge transfer from the transport provider to the shipper concerning what the shipper needs to consider when tendering sustainable transport solutions. The second part consists of an information transfer from the shipper to the transport provider, allowing the shipper to share relevant information regarding the tendered lanes with the transport provider. The two parts of the knowledge exchange, the knowledge transfer and the information transfer, are presented and developed below. A summary of the knowledge exchange can be found in figure 9.

Knowledge transfer from transport provider to shipper

To aid the shippers in the transition from tendering fossil transport solutions to tendering sustainable transport solutions the shippers should receive a knowledge transfer with useful insights from the transport provider, allowing the shipper to take more informed decisions. Six parameters were found to be important for the shipper to consider when implementing a sustainable transport solution.

The first parameter that the shippers must consider and be prepared for before initiating a tendering process is the extended implementation lead time that sustainable transport solutions, in most cases, demand. By planning for an implementation date in the tender process that occurs far in the future more possibilities to source sustainable transport solutions are enabled. Further, the knowledge transfer should inform the shippers of the possibility of a stepwise implementation of the transport solution. This information can be useful in cases where longer implementation lead times are an issue.

The second parameter that should be included in the knowledge transfer is the length of the contract. In the past one to maximum two years has been the norm. When switching to a more sustainable transport solution multiple aspects would benefit from longer contract times, perhaps 5 years. With a longer contract time, investment costs can be split over a longer period of time, decreasing the TCO. Longer contract times could also aid stepwise implementation, starting with turning some of the lanes sustainable and progressively turning more and more lanes. Moreover, longer contract times could mean that suppliers dare to invest in sustainable transport solutions because of the decreased TCO.

The third parameter that should be included in the knowledge transfer informs the shippers about how they can ease the transformation to a sustainable transport solution by making sustainable choices in their own facilities and infrastructure. This could be done, for example, by facilitating charging on site or making renewable energy investments such as solar panels. In the decisions regarding these sustainable choices, it could be beneficial for the shipper to align the transport budget with e.g., the facility budget and/or the sustainability budget, to see if the cost of the investment can be split between different budgets. These indirect actions can help to lower the overall cost in tenders for sustainable transport solutions as fewer aspects might need to be incorporated in the tender.

Fourthly, one parameter that has been seen to be crucial when implementing a sustainable transport solution is the level of flexibility of the shippers. Hence, the shippers should be informed about the needed flexibility in the knowledge transfer. To achieve as high uptime as possible it is important to maximize the vehicles capacity, both in terms of fill rate and run time by, for example, optimizing the charging time. The higher level of flexibility available, the easier it is to facilitate a maximized vehicle capacity.

A fifth parameter that should be included in the knowledge transfer is that the shippers should be informed about the benefits of including the sustainability team in the discussions regarding transport. Thus, aligning the decisions with the sustainability goals of the company. By having expert knowledge within sustainability at the table, a potential knowledge gap could be closed.

Lastly, the shipper should be informed of the benefits of forming a partnership with the transport provider in the knowledge transfer. One way to support the growth of sustainable transport solutions is to form a partnership between shippers and transport providers. Through a partnership information can be shared with greater ease and investment cost can be split between the parties. A partnership could provide a more holistic approach, simplifying organizational structures related to transport. A holistic approach is especially beneficial for sustainable transport solutions since they are more complex, with more aspects to consider (e.g., longer implementation lead times and development of new fuel infrastructure), than fossil transport solutions.

Knowledge transfer from shipper to transport provider

The purpose of a knowledge transfer is to allow the shippers to share relevant information with the transport providers in an easy and standardized way. With information about the shipper’s prerequisites, the transport provider could create a more informed solution. The knowledge received could also shorten the implementation lead time by decreasing the time spent on certain implementation stages, such as site visits and infrastructural planning. During the study, it was identified that there are three specific areas where information sharing could be particularly important. These three areas are infrastructural arrangements, investments in sustainable energy systems and flexibility span. However, it is important to note that these areas should not be the only focus of the information transfer. Rather, they should serve as guidelines to encourage broader information sharing. It is likely that there are additional areas where sharing information could be beneficial, and these should also be considered.

The first area identified as important for the information transfer pertains to infrastructural arrangements that are already in place or decisions related to future infrastructural arrangements on site. By sharing this information with the transport provider, the shipper can receive a customized solution that takes into account their specific infrastructure needs, while also benefiting from the transport provider's expertise in future infrastructural investments.

The second area that was found to be important for information sharing pertains to investments in sustainable energy systems, such as the installation of solar panels or wind turbines on company grounds. Sharing information about these investments can help reduce the implementation lead time in the transition to sustainable transport solutions and spread the cost of implementation over different budgets.

A third aspect that should be included in the information transfer is the shipper's flexibility span. Flexibility is found to have a great influence on the efficiency of the transport solution. Compared to fossil transport solutions, sustainable transport solutions need to consider more variables, hence produce a more complex output. Therefore, flexibility in areas such as delivery and pick-up times or routes could have an impact on the final result.

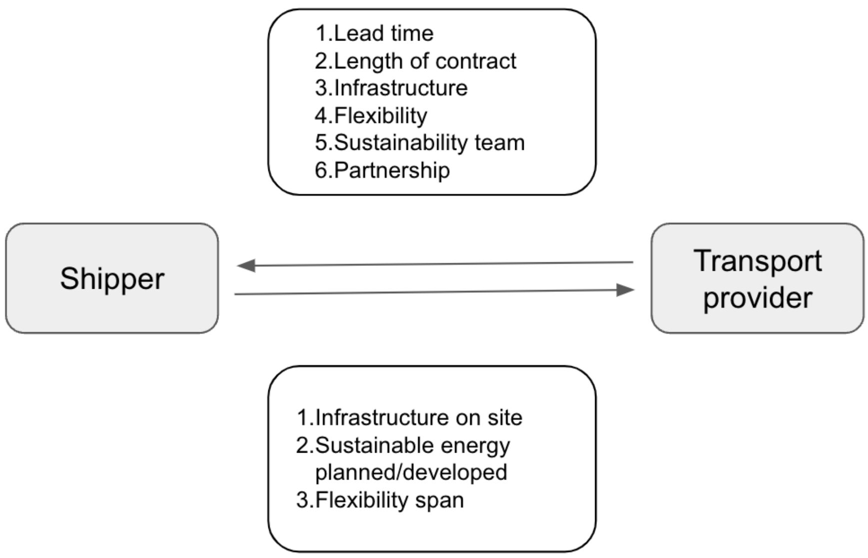

Figure 9: Summary of knowledge exchange

7.2 Alternative measuring criteria

To answer GQ3, how sustainability can be measured in the tendering process, multiple alternative measuring criteria have been developed.

The goal of adding alternative measuring criteria to a standardized tendering process is to enable comparability between different transport solutions. There are multiple perks with using a standardized process besides facilitating comparability. A standardized process is usually more efficient and easier to implement without much prior knowledge. A set process can also be used to get an overview of all tenders and aid internal organization. Hence, standardized processes could be a good way to tender. However, the study showed that sustainable criteria are rarely prioritized in a standardized tendering process today, making it hard to compare sustainable alternatives with traditional ones. By reshaping the standardized process and adding more sustainable criteria it will be easier to account for sustainability KPIs and overall make an informed decision. Four solutions that can be used to reshape the standardized tendering process are identified. These solutions are presented and developed below.

Monetization of CO_2

One way to make sustainable transport solutions more comparable to fossil transport solutions is to assign an economical value to the CO_2 emissions. The economic value can easily be compared between different solutions and with other economic factors, giving a better understanding of the full economic picture. Monetization models for CO_2 are dependent on multiple aspects. Usually, the models consist of a combination of governmental policies (e.g., carbon taxes, emission cap/trades), market mechanisms and the company's internal view on sustainability. According to STP, most companies produce and use their own internal monetization model for CO_2. The lack of correlation between different companies could lead to fluctuations in the models. However, the nature of the models is sensitive to external factors (e.g., changes in regulations) making them quickly outdated. The monetization models for CO_2 reflect the company's internal values and as long as the internal models are consistent and only compared internally, the variations between different companies' models would be negligible.

Another way to monetize CO_2 is to correlate the CO_2 saved by choosing a more sustainable solution with other actions taken to reduce the CO_2 footprint of the company. During the interviews the transport buyer at The Beverage company explained that they chose to focus their sustainability actions on what they thought was the cheaper option, emissions compensation, instead of choosing a more sustainable transport solution. This was found to be an interesting perspective and showed that it is worth investigating what the cheaper option actually is. Hence, shippers should align their CO_2 actions and compare the monetary value per saved CO_2 unit. The Beverage company, for example, needs to compare the total cost of fossil transport solutions and emission compensation with the cost and reduction in CO_2 of a sustainable transport solution.

The shipper does not need to choose between these two ways of monetizing CO_2, but can get benefits from implementing both to get an accurate picture of the total cost of environmental impact.

Comparing transport solutions over longer time periods

As mentioned earlier, it is recommended to consider longer contract times, suggested around 5 years, for sustainable transport solutions. The shippers should regard the costs as investments cost to see benefits in the long run. In order to ensure cost comparability between different transport solutions during the tendering process, the contract length must be taken into account when calculating costs. A benefit of comparing costs over longer time periods is to gain insight into future costs. Understanding the future costs can ease decision-making related to transport as it can provide an understanding of the costs associated with not making the switch to sustainable transport solutions now.

One way of implementing this in the standardized tendering process could be to design the formulas in such a way that time is one of the variables, making it easy to scale up and down. A simplified example (a fully developed equation would need to take more parameters into consideration) of this, can be seen in Equation 1. The equation showcases the TCO of the transport solution, benefiting sustainable transport solutions which usually have a lower operating cost.

$$Cost\ per\ time\ unit = \frac{(price\ of\ investment + operating\ price)}{contract\ length}$$

Equation 1: Cost per time unit

To obtain an estimation of the future costs of sustainable transport solutions, it may be beneficial for the shipper to request or develop a forecasting model. Such a model could take into account various factors that affect the costs, such as the expected CO_2 emissions of vehicles, fuel prices, emission taxes, potential growth opportunities, and future investments. By considering these factors, the shipper can gain insights into the potential long-term costs of the solution and make informed decisions based on this knowledge.

Emission reduction KPIs

To make it easier to source sustainable transport solutions the shippers need to evaluate their selection criteria to have a comprehensive overview of the sustainability ambitions of the company. The selection criteria could be complemented with specific emission reduction targets for transport to have measurable goals to work towards. Consequently, if implemented, the shipper will have a wider range of decision parameters making it possible to dismiss solutions which do not comply with the shipper’s KPIs. Hence, transport solutions which do not align with the sustainability goals of the company can be detected as they do not fulfill the requirements for the KPIs. Moreover, by using stricter sustainability KPIs during the *Define specification* stage in *The WACK model*, the tendering process can be simplified by eliminating non sustainable transport solutions at an early stage.

Scope 3 emissions reporting

As previously mentioned, a newly introduced European Union regulation mandates that large companies report their scope 3 emissions. Therefore, incorporating this requirement in the tendering process can enable shippers to exercise greater control over scope 3 emissions and influence their emission report more easily. Compliance with scope 3 emission reporting is compulsory for large companies, making it an easy modification to the tendering process. If not addressed during the tendering process, it must be addressed in the company, nonetheless.

One possible approach to incorporating scope 3 emissions in the tendering process is to request transport providers to disclose their emissions. Moreover, the scope 3 emissions can serve as a selection parameter, and shippers can set a target for scope 3 emissions and KPIs to achieve it, thereby guiding their decision-making process.

7.3 Dedicated tendering process

To answer GQ4, how the supplier relationship affects the tendering of sustainable transport solutions, the effects of a dedicated tendering process and a shipper-transport provider partnership is explained.

The objective of separating tendering of sustainable transport solutions from the conventional tendering process is to adapt the process to sustainable transport solutions. The shipper can predefine the desired percentage of sustainable transport and tender that segment separately. This will enable the comparison of sustainable transport solutions only with other sustainable transport solutions, eliminating all non-sustainable solutions at an early stage and simplifying the tendering process.

Moreover, as previously stated, sustainable transport solutions are often more complex, with more parameters to consider. Hence, the procurement of sustainable transport solutions could benefit from a holistic approach as described in 1.3 in Table 2, where one transport supplier provides all required parameters in the transport solution. In a holistic approach, the transport provider can, for example, arrange and align the development of infrastructure, vehicle availability and set up a plan to ensure a high uptime for the vehicle during operating times. Having a separate process for the sustainable transport tenders could make it easier for the shipper to find a suitable transport provider that can offer a holistic solution. The complexity of a holistic approach benefits from a closer relationship between the shipper and supplier as closer collaboration can ease the implementation process, allowing for an environment where a partnership can be formed. A partnership would allow for increased flexibility and collaboration between the shipper and the transport provider. Hence, a closer relationship can simplify communication and create a common incentive to create a successful operation. Another advantage of forming a partnership when tendering sustainable transport solutions is the length of the contract. As previously mentioned, longer contract time is beneficial to sustainable transport solutions as the TCO can be split over a longer time period.

One way to design a separate tendering process, with a partnership in focus, could be to perform a pre-study. As mentioned in the *The WACK model,* a pre-study should be done by the shipper to get a better understanding of the situation today as well as the desired state. In a partnership the pre-study could more easily be done in collaboration between the shipper and the transport provider, sharing each other's expertise. When closing the information gap, as previously mentioned, the transport provider can create a more detailed and customized offering.

8 Result

The aim of the thesis is to reform the transport tendering process to support the growth of sustainable transport solutions. To reach the aim a model, *The WACK model*, was developed in the framework to provide the foundation of the thesis. From *The WACK model* a set of guiding questions could be developed. The guiding questions were used as a base for the interview study as well as to structure the analysis. The guiding questions yielded three results: *Knowledge exchange*, *Alternative measuring criteria* and *Dedicated tendering process*. These three results could be used to adapt *The WACK model* to further develop a reformed tendering process to support the growth of sustainable transport solutions. The reformed transport tendering process can be seen in Figure 10.

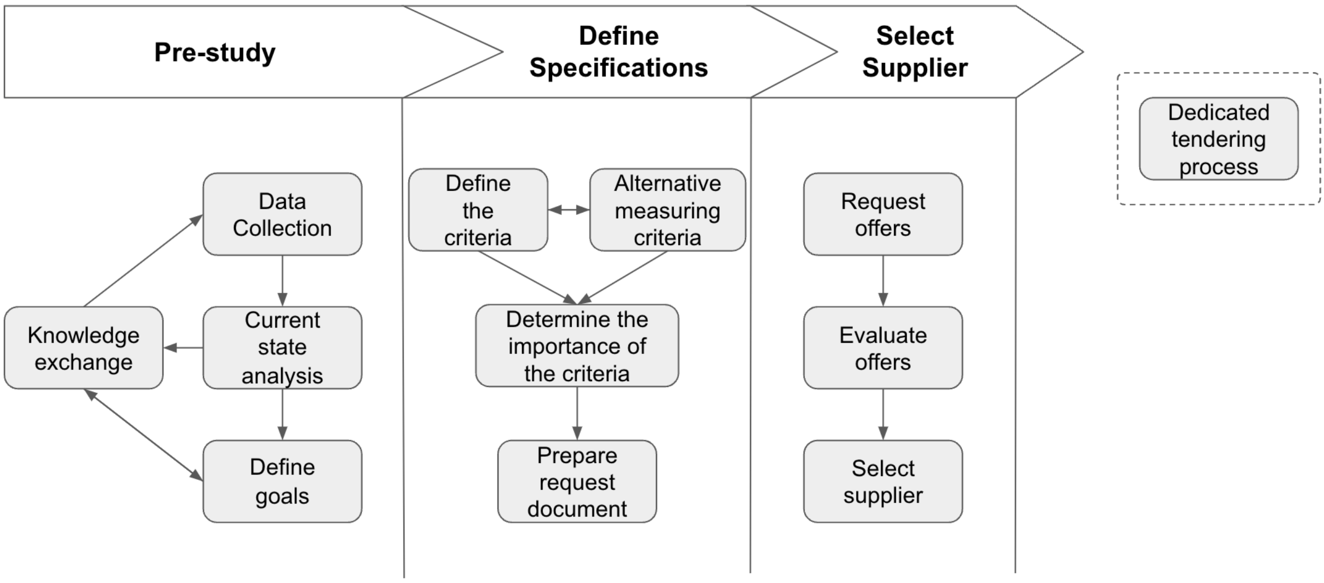

Figure 10: Adaptation of *The WACK model*

The first result from the analysis, *Knowledge exchange*, can be transferred to *The WACK model* in the *Pre-study* step. The transport providers can provide the shippers with knowledge for the *Data collection* step. This knowledge can aid the shipper in understanding what data is important to collect. Through the knowledge exchange, the shippers can also provide the transport providers with information about their *Current state analysis* to inform them about the prerequisites at hand. Together, the transport provider and the shipper can carry out the *Define goals* step to have common ambitions.

The second result from the analysis, *Alternative measuring criteria*, can be transferred to *The WACK model* in the *Define specifications* step. While defining the criteria the shipper can ensure that sustainability is incorporated by looking at the *Alternative measuring criteria*. The internal policy and sustainability goals of the shipper will determine the level of integration of the *Alternative measuring criteria*. However, by incorporating them into *The WACK model*, the *Alternative measuring criteria* will always be discussed in the tendering process. The shipper will need to make an active choice not to incorporate sustainable criteria instead of the other way around. Once the criteria are defined the process can continue with *Determine the importance of the criteria*.

The last result from the analysis, *Dedicated tendering process*, cannot be transferred into *the WACK model* but instead *the WACK model* can be used to perform a dedicated tendering process. If the shipper wishes to compare different transport providers in a dedicated tendering process, then the WACK model can be used as it is but with only sustainable transport providers allowed to participate. If the shipper instead wishes to establish a partnership with one supplier and therefore wants to focus the tendering process on them, then some elements of the dedicated tendering process can be extracted and used. Firstly, a knowledge exchange can be useful since the knowledge gap between the shippers and the transport providers still exists. Secondly, defining a goal together can aid the partnership, giving both parties a common goal. Thirdly, the *Alternative measuring criteria* can be used to ensure that the shipper upholds the company’s internal sustainability goal and to set sustainability targets for the partnership.

9 Conclusion

This thesis has identified a reformed transport tendering process, *The WACK model*. *The WACK model* was developed from three tendering processes *The tendering process by van Weele and Rozemeijer* (van Weele and Rozemeijer, 2022), *The tendering process by Rogerson* (Rogerson, 2014), and *The tendering process by Trafikverket* (Moen, 2016). *The WACK model* was first adapted towards the tendering of transport solutions. To incorporate a sustainability focus in the model three adaptations were developed in the thesis. These adaptations were: *Knowledge exchange, Alternative measuring criteria* and *Dedicated tendering process*. With the adaptations, *The WACK model* paves the way for the growth of sustainable transport solutions.

The first adaptation consists of the *Knowledge exchange*. The *Knowledge exchange* needs to be done in two directions, the shipper needs to get a better understanding of the sustainable transport market and the transport provider needs to get a better understanding of the shipper's situation. The shipper needs to be made aware of the adjustments that a sustainable transport solution requires and understand how they can adapt to them. The transport providers need to get the possibility to receive information about the prerequisites of the shipper in order to deliver an optimal transport solution.

The second adaptation identified in the thesis is to add *Alternative measuring criteria* to the tendering process. These criteria would allow the shipper to make easier comparisons between different transport providers' solutions and consider more aspects beyond price. The thesis also shows that some of these criteria will become mandatory in the near future due to EU regulations, such as the scope 3 emission reporting initiative. The data required in some of the criteria would have to be collected regardless of its incorporation in the tendering process. Hence, including it in the process will not require any additional resources for the shipper.

The third adaptation recommended in the thesis is to separate the tendering process of sustainable transport solutions from the tendering process of non-sustainable solutions. By having the *Dedicated tendering process* for sustainable transport solutions, the shipper can easier make a deliberate choice aligned with internal sustainability goals. Thereby, the shipper can save resources during the tendering process by excluding non-compatible solutions at an early stage of procurement. The thesis also found that a holistic approach, with one transport provider providing all aspects related to the sustainable transport solution (E.g., fuel infrastructure), is desired and more easily accomplished with the *Dedicated tendering process*. The thesis suggests that the shippers should consider forming a closer relationship with the transport providers to facilitate a holistic approach.

With these adaptations to the tendering process there are some risks that need to be considered. The first risk is the question about what is sustainable. The adjustments include the implementation of sustainable KPIs, but the level of sustainable actions taken still lies with the shipper. There is a risk of green washing if the KPIs are not considered thoroughly. To support the growth of sustainable transport solutions knowledge needs to be the foundation of the KPIs.

The second risk with the identified changes to the transport tendering process is the risk that comes with separating the tendering process for sustainable and non-sustainable transport solutions. By looking at them separately, there is a risk that the bigger picture and scalability of the transport solution is not considered. There is a risk that the shipper becomes satisfied with just a part of their business being sustainable. Hence, if a shipper implements a dedicated tendering process a growth plan is essential.

The third risk with these adaptations is the risk that comes with information sharing. The thesis has highlighted the importance of sharing both knowledge and information between the shipper and the transport provider. With a comprehensive information flow and a close relationship trust is fundamental to overcome the risks, such as sensitive information leakage. Stepwise implementation could be beneficial to successively build trust.

A fourth risk identified with the reformed tendering process is its limited time of relevance. The identified adaptations are built on the current state of the transport market. If the market shifts, so will the usefulness of the adaptations. The adaptations are built on closing the gap between the fossil fuel-oriented transport market of today with the desired sustainable transport market of the future. However, once the desired state is reached there will not be a use for the process identified in this thesis. Once the market is fully sustainable the tendering process can regress to a simpler state, perhaps only comparing price and reliability again. However, the tendering process identified in this thesis can be useful and relevant in any new situation that might arise in the transport market, making it applicable for future innovations.

The last risk identified with the suggested tendering process is the risk of a complicated implementation. It is up to the shippers themselves to decide what tendering process to use. As identified through the interviews, the shippers can be satisifed with the process they have today and are not striving to change it. The thesis identified that the shippers are hesitant to being first in making the switch to sustainable transport solutions, preferring others to take the lead. Hence, it is up to the shipper to actively choose to make these adaptations. However, soon sustainability won’t be a choice but a governmental requirement, and when that time comes, shippers will not benefit from being last. To stay successful, it is of great importance that shippers put themselves at the forefront of sustainable innovation. Sustainable transport begins with a sustainability focus in the tendering process. Shippers can ensure a sustainable tendering process by using *The WACK model*.

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