



DEGREE PROJECT IN INDUSTRIAL ENGINEERING AND
MANAGEMENT,
MASTER IN INDUSTRIAL ENGINEERING AND
MANAGEMENT,
SECOND CYCLE, 30 CREDITS
STOCKHOLM, SWEDEN 2017

The importance of mandate when purchasing carbon neutral

CHRISTINA KOIDIS

ANDREA LAGERSTRÖM

Vikten av mandat vid koldioxidneutrala inköp

av

Christina Koidis
Andrea Lagerström

Examensarbete INDEK 2017:50
KTH Industriell teknik och management
Industriell ekonomi och organisation
SE-100 44 STOCKHOLM

The importance of mandate when purchasing carbon neutral

by

Christina Koidis
Andrea Lagerström

Master of Science Thesis INDEK 2017:50
KTH Industrial Engineering and Management
Industrial Management
SE-100 44 STOCKHOLM



**KTH Industriell teknik
och management**

Examensarbete INDEK 2017:50

Vikten av mandat vid koldioxidneutrala inköp

Christina Koidis
Andrea Lagerström

Godkänt 2017-06-05	Examinator Lars Uppvall	Handledare Andreas Feldmann
	Uppdragsgivare Skanska	Kontaktperson Joakim Suhr

Sammanfattning

Den svenska regeringens mål om noll nettoutsläpp av växthusgaser (klimatneutralitet) år 2050 kommer att innebära ett skifte av arbetssätt för svenska byggbolag. Vidare har byggnadsfasen visat sig representera en större del av den totala klimatpåverkan än man tidigare trott, vilket sätter press på klimatneutrala inköp. Idag tillämpas enbart preferenser snarare än krav gällande inköp med lägre växthusgasutsläpp, vilket delvis kan bero på begränsad litteratur med fokus på klimatneutrala inköp samt vikten av mandat.

Syftet med denna studie har således varit att undersöka hur mandat inom en organisation påverkar klimatneutrala inköp. För att undersöka detta samband genomfördes en fallstudie på Skanska, som är det enda byggbolaget i Sverige med visionen om att bli klimat neutralt till år 2050. Resultatet bygger på totalt 24 intervjuer varav 21 stycken genomförda på Skanska samt två stycken på två olika externa bolag.

Resultatet visade att det uppstår ett gap mellan Skanskas vision och inköpsavdelningens arbete när ett företag bestämmer sig för att bli klimat neutralt. Vår slutsats är att företag som strävar mot att genomföra klimatneutrala inköp måste implementera tydliga mandat i organisationen för att medarbetarna ska ha förutsättningarna att kunna ta klimatneutrala beslut.

Nyckelord: Mandat, Inköp, Klimatneutralitet.



**KTH Industrial Engineering
and Management**

Master of Science Thesis INDEK 2017:50

**The importance of mandate when purchasing
carbon neutral**

**Christina Koidis
Andrea Lagerström**

Approved 2017-06-05	Examiner Lars Uppvall	Supervisor Andreas Feldmann
	Commissioner Skanska	Contact person Joakim Suhr

Abstract

The Swedish government is aiming for a society with a net level of zero greenhouse gas emissions (carbon neutrality) by 2050, which will require a change of working methods in the Swedish construction industry. From a life-cycle perspective, the construction phase has been shown to represent a greater part of the overall climate impact than previously thought, which puts pressure on carbon neutral purchases. Today, only preferences are applied regarding lower greenhouse gas emissions rather than requirements when purchasing, which may be due to limited literature addressing both carbon neutral purchasing and the importance of mandate.

The purpose of this study has been to investigate how mandate within an organization affects carbon neutral purchasing. To investigate the relationship, a case study was conducted at Skanska, the only construction company in Sweden with the vision of becoming carbon neutral by 2050. The result is based on 24 interviews and 21 were conducted at Skanska and two at two different external companies.

The result showed that when there is a gap between Skanska's vision and the purchasing department's work when a company decides to become carbon neutral. Our conclusion is that companies that strive to implement carbon neutral purchasing must implement clear mandates in the organization to ensure that the employees have the potential to take carbon neutral decisions.

Key-words: *Mandate, Purchasing, Carbon neutrality.*

Table of Contents

1. Introduction	1
1.1 Background	1
1.2 Problematization	1
1.3 Purpose and research questions	2
1.4 Delimitations	2
1.5 Disposition	3
2. Transition from supply chain management to sustainable supply chain management	4
2.1 Traditional supply chain management	4
2.2 Transition to sustainable supply chain management	7
2.2.1 The importance of green supplier selection	10
2.3 Framework for carbon neutral purchasing	12
3. Procurement within the Swedish construction industry	13
3.1 Carbon neutrality within the construction industry	13
3.2 Laws and regulations	14
3.3 Green purchasing within the Swedish construction industry	14
4. Research method	16
4.1 Research design	16
4.2 Literature review	17
4.3 Data collection	18
4.3.1 Pre-study	18
4.3.2 Interviews	18
4.3.3 Observations	20
4.4 Quality of analysis	20
4.4.1 Validity	20
4.4.2 Reliability	21
4.4.3 Generalizability	21
4.4.4 Ethics	22
5. Findings	23
5.1 Existing organization and process	23
5.1.1 Aiming for a carbon neutral society	23
5.1.2 Existing collaboration within Skanska	23

5.1.3 Standardized sourcing process	25
5.1.4 Criteria to procure carbon neutral	26
5.2 Lack of mandate	28
5.2.1 Industry	28
5.2.2 Mandate within the organization	29
5.2.3 No mandate of driving improvements	34
6. Discussion	35
6.1 Discussion of findings and future recommendations	35
6.1.1 Knowledge sharing within the organization	35
6.1.2 Vertical mandate	37
6.1.3 Horizontal mandate	38
6.1.4 Preparing the market	40
6.2 Robustness of the study	41
7. Conclusions and future studies	42
7.1 Reviewing the purpose of the study	42
7.1.1 Answering the SRQ 1	42
7.1.2 Answering the SRQ 2	42
7.1.3 Answering the MRQ	43
7.2 Contribution and future research	43
References	45
Appendix A - Interview questions	1
Appendix B - Skanska's Green color palette	1
Appendix C - Recommendations	1

Table of figures

Figure 1. <i>The structure of the thesis.</i>	3
Figure 2. <i>Sustainable Value framework by Hart and Milstein (2003).</i>	8
Figure 3. <i>The house of sustainable supply chain management (Teuteberg and Witterstruch, 2010).</i>	10
Figure 4. <i>The investigation's research process.</i>	17
Figure 5. <i>Departments that influences the purchasing department.</i>	24
Figure 6. <i>Tollgates (Skanska).</i>	25
Figure 7. <i>Parameters presented during Tollgate 1 (Skanska).</i>	25
Figure 8. <i>Skanska's segmentation of suppliers (Skanska).</i>	26
Figure 9. <i>Level of engagement in the sourcing process.</i>	30
Figure 10. <i>The different categorized purchases (Skanska).</i>	32
Figure 11. <i>Percentage of Skanska's spend during 2016 (Skanska).</i>	33
Figure 12. <i>Suggested colors used on the segmentation model.</i>	39

Tables of tables

Table 1. <i>Classification of a supplier items</i> (Kraljic, 1983).	5
Table 2. <i>Criteria to procure carbon neutral.</i>	12
Table 3. <i>Interviewees in the pre-study.</i>	18
Table 4. <i>The interviewees.</i>	19
Table 5. <i>Skanska's current state.</i>	27
Table 6. <i>The outcome of self-assessment</i> (Skanska).	33

Glossary of terms

Audits	An objective evaluation of suppliers.
Framework agreement	An agreement between two parties, with the purpose to establish a long-term contract.
Mandate	Mandate is defined as the knowledge the employees have regarding their responsibility areas and what actions they can take. The vertical mandate is defined as the mandate within the procurement department and the horizontal mandate is the mandate between departments and their collaboration.
Procurement	The entire purchasing process, strategy, implementation and acquisition.
Project specific agreements	Agreements that are developed based on a specific project's needs and demands.
Self- assessment	A questionnaire Skanska Sweden sends out to their suppliers to determine if the suppliers fulfil their requirements.
Sourcing	Finding and engaging suppliers in order to develop framework agreements.

Table of abbreviations

NPU	Nordic Procurement Unit.
SCM	Supply Chain Management.
PSM	Purchasing and the Supply Management.
SSCM	Sustainable Supply Chain Management.
LCA	Life Cycle Assessment.
EPD	Environmental Product Declaration.

Foreword

This master thesis was conducted during the spring 2017 at the department of Industrial Economics and Management at KTH Royal Institute of Technology in Stockholm, Sweden. As we are attending two different programs, Design and Product realisation and Industrial Engineering and Management, we have generated two versions of this report.

Acknowledgements

We would like to begin by thanking our supervisors Joakim Suhr and Jan Johansson at Skanska for supporting us through the master thesis. Skanska has embraced us with open arms and we are very grateful for this opportunity. We would also like to thank all the interviewees that took the time to participate, without you there would not have been a master thesis.

Secondly, would we like to thank our supervisor at KTH Royal Institute of Technology, lecturer and researcher in supply chain management Andreas Feldmann for his guidance and inspiration during the research process. We would also like to thank the peer review group that helped us during the seminars and gave us valuable and continuous feedback.

Finally, we would like to express our gratitude to our families for supporting us during our entire education.

Thank you all for taking the time,
Andrea Lagerström and Christina Koidis
Stockholm, 05 June 2017

1. Introduction

This section describes the background and the problem formulation of the study. Furthermore, it presents the purpose, the research questions, and the delimitations of this master thesis. Lastly, the outline of the thesis is described.

1.1 Background

Sustainability has become a higher priority within the construction industry (World economic forum, 2017), imposing companies to develop methods with less impact on the environment. Furthermore, Sweden has a vision of not generating any net emissions of greenhouse gases in the atmosphere by 2050 (Sveriges Riksdag, 2014). Today, the four biggest construction companies in Sweden, Skanska Sweden (Skanska), Peab, NCC, and JM, have stated that they all are actively working on minimizing their environmental footprint in different ways (Skanska, 2016; Peab, n.d.; NCC, 2016; JM, 2016). However, Skanska has taken this one step further and are the only company in the Swedish construction industry to sign the goal of becoming carbon neutral by 2050 (Burbridge, 2012; Skanska, 2015).

Carbon neutrality is a great challenge for many industries and it is therefore important to develop a strategy to reach the goal, as it will constitute the basis for the costs and the success of becoming carbon neutral (The Swedish Construction Federation, 2016a). Despite Skanska's high ambitions in terms of becoming carbon neutral they have not a clearly defined strategy that shows how to achieve this challenge.

A former assumption in the construction industry has been that a building's carbon emissions mainly come from its operational life time, i.e. when the consumers are living in their home, rather than during the construction phase. However, a new study conducted by the Swedish Construction Federation in 2015 highlights that the largest climate impact is generated during the construction phase as it can represent up to 85 % of the total impact. This puts pressure on how to purchase materials and products with less carbon emissions, and thus the procurement department. (The Swedish Construction Federation, 2015)

1.2 Problematization

In order to not generate any net greenhouse gas emissions, it is important to consider the whole supply chain (Krause, Vachon, and Klassen, 2009). The procurement processes can be seen as a starting point to ensure that the purchased materials and products are produced with the lowest carbon emissions possible. Nevertheless, it is currently vaguely defined when and where in the procurement processes and sustainability issues should be considered and by whom, as there is limited empirical research within this area.

Organizations must place higher demands on the suppliers in terms of presenting carbon emission data and to actively work on minimizing emissions of materials and products. A study of 78 papers published between 2000 and 2008 showed that the most common criteria when selecting suppliers during these years were quality, delivery, and price (Ho et al., 2010). The government's goal regarding carbon neutrality is relatively new and it is expected that the procurement departments

within the construction companies have not fully changed their supplier selection methods yet. As the previous focus has been on quality, delivery, and price, it may be complex for employees to know if they have mandate to involve carbon emissions as an important parameter when evaluating suppliers.

In the Swedish construction industry, environmental aspects have only been applied as preferences rather than requirements when purchasing (Faith-Ell, 2005) and criteria regarding carbon emissions are seldom considered. This can be due to limited literature addressing the importance of what mandate the purchasers should have to make decisions based on criteria regarding carbon emissions. Further research is therefore needed to influence the development of organizations' supplier selection in order to become carbon neutral.

1.3 Purpose and research questions

The purpose of the study is to investigate how mandate within an organization affects carbon neutral purchasing. Mandate is defined as the knowledge the employees have regarding their responsibility areas and what actions they can take. In order to fulfill the purpose of the study, a main research question was formulated:

MRQ: How does the role of mandate affect carbon neutral purchasing?

To be able to answer the main research question we had to divide mandate into two different perspectives, vertical and horizontal mandate. The vertical mandate is defined as the mandate within the procurement department and the horizontal mandate is the mandate between departments and their collaboration. The first sub-research question that needed to be answered was:

SRQ 1: How does vertical mandate within the procurement department affect carbon neutral purchasing?

To be able to understand how the procurement department is affected by other departments a second sub-research question was developed:

SRQ 2: How does horizontal mandate between departments affect the carbon neutral purchasing?

1.4 Delimitations

In order to conduct the study within the intended timeframe, some delimitations have been made. The study has only investigated the construction company Skanska and the Swedish procurement process even though the company is operating in a global market and has a Nordic procurement process.

The other delimitation has to do with contracts, since Skanska has two different types of contracts with their suppliers. The study has focused on the procurement process with framework agreements as they are more long term, strategic, and have a standardized sourcing process compared to the project specific agreements and the line organization.

Only sourcing of products was included in the scope, which means that only physical components are considered and not services as a study of sourcing of services was conducted parallel to this research. The study does not intend to change Skanska's suppliers or their subcontractors'

processes as they were not included in the scope. The study has focused on which aspects Skanska should require of their suppliers in order to base their evaluation during the procurement processes. The study has not focused on the customer perspective of their decisions on how to use Skanska's work.

Lastly, the scope of the research did only consider the perspective of mandate from the purchasing department, this delimitation was done to get deep insight from their perspective. The perception of mandate from other departments was not taken into consideration.

1.5 Disposition

The structure of the thesis is visualized in figure 1, which provides an overview of the report. After the introduction chapter, the literature and theory that has been used are presented. Next, the report continues to briefly describe the challenges the construction industry are facing in terms of including carbon neutrality within procurement. In the subsequent chapter, the methodology that has been used in order to answer the research question is presented. Then, the findings of the study are described and lastly, the discussion, conclusions, and recommendations for future studies are presented.

1. Introduction
Background Problematization Purpose and research questions Delimitations Disposition
2. Transition from supply chain management to sustainable supply chain management
Traditional supply chain management Transition to sustainable supply chain management Framework for carbon neutral purchasing
3. Procurement within the Swedish construction industry
Carbon neutrality within the construction industry Law and regulations Green purchasing within the Swedish construction industry
4. Research method
Research design Literature review Data collection Quality of analysis
5. Findings
Existing organization and process Lack of mandate
6. Discussion
Discussion of findings and future recommendations Robustness of the study
7. Conclusion and future studies
Reviewing the purpose of the study Contribution and future research

Figure 1. *The structure of the thesis.*

2. Transition from supply chain management to sustainable supply chain management

This chapter introduces previous publications within the field of supply chain management and sustainable supply chain management in order to understand previous research. Lastly, a framework based on the existing literature was developed.

2.1 Traditional supply chain management

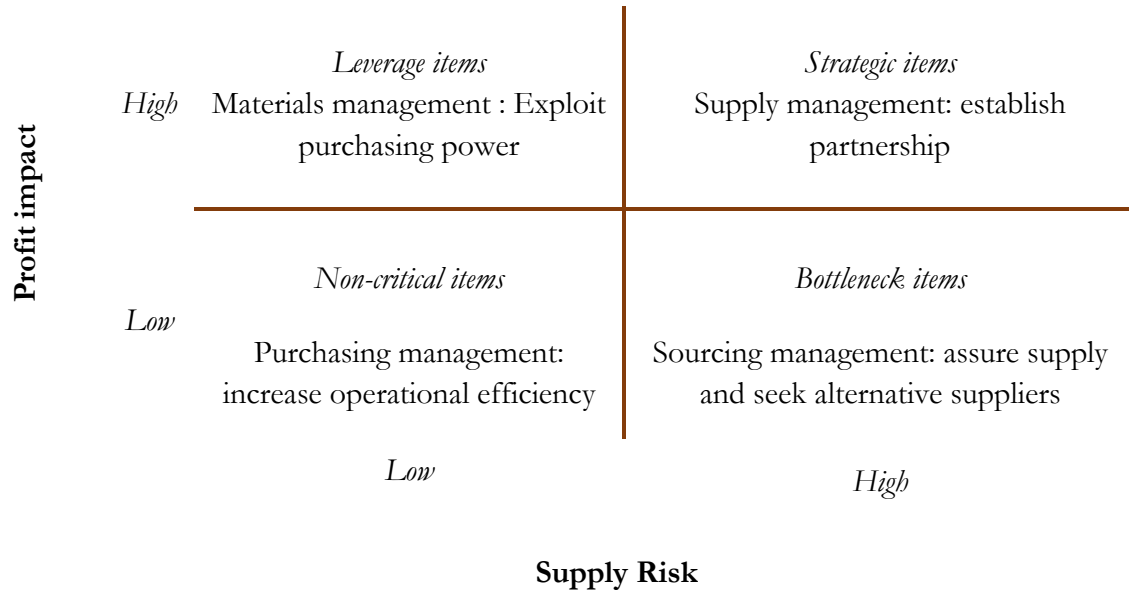
Supply Chain Management (SCM) has earlier been presented in the literature as logistic management (Cooper and Ellram, 1993) where the purchasing department have been a service function to operations, marketing, engineering, R&D departments, etc. (Leenders, Nollet, and Ellram, 1994). SCM has many definitions “*a system’s approach to managing the entire flow of information, materials, and services from raw materials suppliers through factories and warehouses to the end-customer*” (Leenders and Fearon 2006, pp.6). Or “*an integrative philosophy to manage the total flow of distribution channel from the supplier to the ultimate user*” (Ellram and Cooper, 1990, pp.2). The common attributes of the definitions of SCM are that it includes multiple upstream and downstream processes and activities. Together they transform and transports raw materials or services to finished goods with the purpose of bringing value to the suppliers and the clients. SCM encourage collaboration, coordination, integration and relationships building throughout the entire supply channel (Ballou, 2007). Organizations that have centralized purchasing tend to manage purchase better than decentralized, but a negative aspect of a central purchasing department is that it is less responsive to the market needs (Hayes and Schmenner, 1978).

The value an organization's purchased materials, components, and systems stand for 50-80 % of the total cost of goods sold which highly affects an organization's total cost (Cammish and Keough, 1991). Therefore, the purchasing has become a strategic function (Dubois and Pedersen, 2002). Kraljic (1983) developed a purchasing portfolio model for organizations to evaluate their supply management on a strategic level to minimize cost and risks with the premise that organizations have limited resources (Pagell, Wu, and Wasserman, 2010). An organization's strategies are plans and policies to gain competitive advantages over competitors (Skinner, 1969). The purchasing competitive priorities have been; cost, quality, delivery, and flexibility (Ward, McCreery, Ritzman, and Sharma, 1998; Krause, Pagell and Curkovic 2001; Rosenzweig and Roth, 2004). Both Skinner (1969) and Hayes and Schmenner (1978) indicate that there is trade-off depending on which competitive priorities an organization focus on, and manager’s needs to decide which trade-off to make.

According to Kraljic’s (1983) sourcing strategy, it is important to consider two factors. The first is the strategic importance of the item being purchased, e.g. how much profit can the organization make of a product. The second factor to consider is the complexity of the market, e.g. the risk based on supply and profit.

The aim of the model is to match internal organizational needs with external resources (Dubois and Pedersen, 2002). The classification of the items is seen in table 1.

Table 1. *Classification of a supplier items* (Kraljic, 1983).



Strategic items should be purchased from few suppliers to which the buyer has a close, trusting and long-term relationship. The selection of the supplier should be based on the total cost and high supply risk (Pagell, Wu, and Wasserman, 2010). To decide which suppliers to use, an extensive analysis of the market and the risks, combining with optimizations models, price forecast and microeconomics analysis should be done (Kraljic, 1983). The reality of partnership is that they are expensive to develop and maintain (Bensaou, 1999).

Bottleneck items should be purchased with an inventory strategic mindset, to minimize risks of not being able to deliver to the end-customer. To evaluate the bottleneck items a market analysis must be conducted combined with forecast models regarding the vendors and price (Kraljic, 1983).

Leverage items should be purchased based on price as there are multiple suppliers offering the same products to identical quality and performance. Due to this, there is no need to invest in a long-term relationship with suppliers, as there are many suppliers available. To find the suppliers, the organization must make decision models to take into account the issues regarding the different suppliers (Kraljic, 1983).

For the *non-critical items* an inventory optimization models should be the foundation of the supply strategy, the items should be purchased from multiple suppliers, and the choice of supplier should be on price. According to Dubois and Pedersen (2002), the purchasing portfolio model is based on a power-dependence relationship with a fixed time horizon. A supplier and organizations relationship evolves as they make businesses, the context of the relationship may change as well as the function of the supplier that the model does not acknowledge.

The purchasing portfolio models have been criticized as it simplifies the complexity of business decisions (Gelderman and Van Weele, 2005), that an organization can base its strategy on two dimensions (Heege, 1981; Dubois and Pedersen, 2002). Dubois and Pedersen (2002) argue that when separating the internal from the external an organization is ignoring efficiency improvements.

Analyze and evaluate the market based on the quality and quantity of the product/service, and if there is potential in using different suppliers or substitute to increase the organization's bargain power (Kraljic, 1983). This way of thinking in term of comparing suppliers based in price is not sufficient anymore in today's volatile market, as there are many other criteria to consider when building a relationship with a supplier (Kromoser et al., 2012). A relationship with a supplier is both complex and dynamic due to the characteristics of the market (Dubois and Pedersen, 2002).

According to Kraljic (1983), an organization should have a suppliers mix with regional supply, and long-term contracts to decrease risks. With the portfolio matrix, a company can map their current suppliers and identify opportunities, vulnerability, and risks. The suppliers are divided into three categories; exploit, diversity, and balanced.

Exploit is when the buying organization dominates the market and the suppliers are low to medium in strength, which increase the buying organizations to achieve a contract with favorable pricing.

Diversity is when an organization should have diversification in its supplier portfolio or find a substitute to be profitable. As the organization has a secondary role in the market and the suppliers' strength is medium to high.

Balanced is when the buying organization and the supplier are balanced in the market, there are no major risks or benefits and the organization should have an intermediate strategy, not being too aggressive or defensive in the procurement process. (Kraljic, 1983)

The company should secure both long-term and short-term contracts with suppliers to ensure supply. The end-result is to have an action plan with a well-documented strategy with information about criteria, timing of critical purchasing materials and so on. (Kraljic, 1983) To cope with the new challenges, the SCM has shifted from a short-term perspective, the work from Kraljic to a long-term perspective, e.g. sustainable supply chain management (Porter and Van der Linde, 1995; Sharma and Henriques, 2005).

2.2 Transition to sustainable supply chain management

Organizations have recognized the importance of their suppliers' work towards sustainability as the pressure on organizations to use resources in the most effective way have increased (Sharma and Henriques, 2005) from various stakeholders (Zailani et al., 2010). Currently, there is limited knowledge on how organizations should design their purchasing processes to ensure sustainable supplier operations (Carter and Rogers, 2008) as the current knowledge is not sufficient to truly have a sustainable supply chain (Pagell and Schevchenko 2014). An organization's sustainability is both connected and affected by the purchasing and the supply management (PSM). The PSM is responsible for using suppliers that comply with the corporate code of conduct and the organization's triple bottom line; social, environmental and economic performance (Reuter et al., 2010).

The supply chain is external to an organization (Carter and Rogers, 2008) and is difficult to imitate as the learning between the buyer and supplier regarding environmental and social performances takes time (Carter, 2005) as the processes often is highly tacit, e.g. skills that are based on learning by doing, and socially complex (Peteraf, 1993).

Supply chains with social and environmental aspects are more difficult to duplicate which increases the competitiveness of an organization, and thus the economic sustainability (Carter and Rogers, 2008). To stay competitive, organizations needs to continuously be receptive to the external environment (Reuter et al., 2010). The definition of sustainable supply chain management (SSCM) that this study will use is the most quoted definition by the Brundtland Commission:

“Meeting the needs of the present without compromising the ability of future generations to meet their own needs”
(World Commission on Economic and Development, 1987 pp.8).

Today, organizations have not taken full responsibility when focusing on sustainability, as organizations that have focused on decreasing pollution have often outsourced it to suppliers. For an organization to develop a SSCM the norms, measurements, the methods and research questions will need to change. (Pagell and Shevchenko, 2014) To transform and become sustainable requires performance on multiple dimensions and connecting enterprise sustainability with shareholders value (Hart and Milstein, 2003).

Hart and Milstein (2003) have developed a shareholder-value framework that tries to tackle the two sources of tension in a firm, long-term profitability and short-term profitability. The framework has two axes; the vertical reflects the firm's need to manage the daily business while simultaneously preparing for the future technology and markets.

The horizontal axis reflects a firm's need to grow and protect internal skills and capabilities while simultaneously taking in new perspectives and knowledge from the market. The framework is divided into four quadrants, see figure 2.

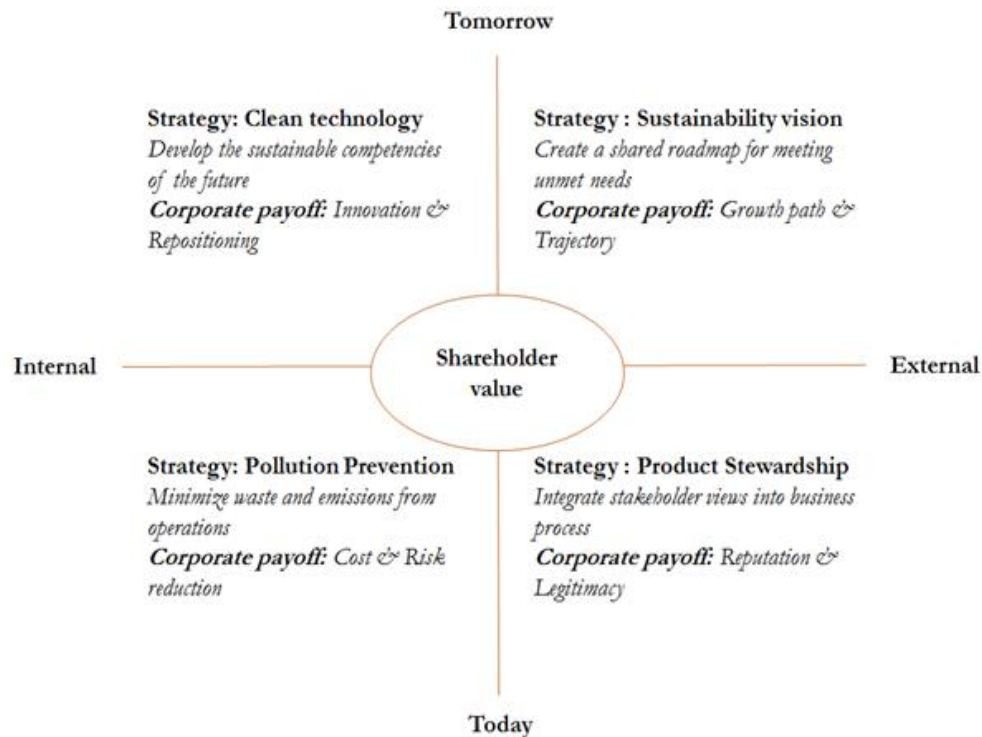


Figure 2. *Sustainable Value framework* (Hart and Milstein, 2003).

The *lower-left quadrant* mainly focuses on the internal performance, to develop skills and capabilities to minimize pollution and waste (Hart and Milstein, 2003). SSCM that focuses on a close-loop system where the goal is to limit waste before it occurs (Porter and Van der Linde, 1995) can be an untapped source of reduction of supply cost through more efficient use of natural resources (Hart, 1995; Florida, 1996). Therefore, when an organization has the right knowledge the exposure and liabilities decreases (Hart and Milstein, 2003).

The *lower-right quadrant* focuses on the extended boundary perspective, i.e. suppliers, customers, media, communities etc., to communicate the responsibility a firm have on its internal performance (Hart and Milstein, 2003). The problem for purchasing functions is how to monitor and develop suppliers in environmental management practices without incurring higher transaction cost or disrupting the flow of production (Simpson and Power, 2005). It is hard to measure the environmental impact in every instance, instead, Pagell and Shevchenko (2014) and Guide, Harrison and Van Wassenhove (2003) suggests that the business models should measure a supply chain's environmental impact based on the life cycle assessment (LCA). By taking an LCA approach will increase the brand reputations and create a momentum of more sustainable practices (Hart and Milstein, 2003).

The upper-left quadrant focuses on operating efficiently in today's market but also to prepare for the future by investing in new technology, develop internal skills and competencies, as well as complementing it with new ones. Without technologies and employees' capabilities, the firm will have difficulties to develop innovations of tomorrow. Pagell, Wu, and Wasserman (2010) found that when suppliers are taking risks by investing in more sustainable approaches/manufacturing, the buyer is bearing some or all of the risk to make it easier for the supplier to change, especially if the supplier is small. Nevertheless, Pagell and Shevchenko (2014) and Hart and Milstein (2003) believes that a sustainable supply chain will probably not be developed in the traditional business models but instead by a new entrant with a radical innovation, which history of innovations indicates (Utterback, 1974). Those firms that invest in clean technology tend to create an organizational environment that supports innovations, but the payoff may take time as it is more a trial and error, and contains risks (Hart and Milstein, 2003).

The upper-right quadrant is based on a clearly articulated vision with reasonable expectations of the future in terms of growth and performance efficiency. The trajectory is a guidance included organizational priorities, technology development, resources allocation and business model design to support future innovations (Hart and Milstein, 2003).

For an organization to be successful and create sustainable value for the shareholder, the firm, and society, an organization must simultaneously focus on becoming successful in all four quadrants. However, an organization cannot simultaneously focus on all quadrants at the same time, but should instead focus on smaller experiments and use funding from a separate account with other measurement and criteria than the short-term revenue streams (Hart and Milstein, 2003). Carter and Rogers (2008) argues differently that an organization that simultaneously attempts to maximize performance in all three dimensions of the triple bottom line, will perform better than organizations that only focus on maximizing one dimension, regardless of dimension. Teuteberg and Wittstruch's (2010) house of sustainability, seen in figure 3, can summarize Hart and Milstein's (2003) value framework. The foundation of the house, i.e. the organization, is that it needs to follow laws, standards, regulations, and risk and compliance management. The roof is balanced on Elkington's (1998) triple bottom line pillars; environmental, economic, and social performance, which is equally bearing.

Throughout the organization, strong values in terms of sustainability should be integrated to support the corporate strategy, as well as an efficient and flexible IT system that supports green activities (Teuteberg and Witterstruch, 2010).

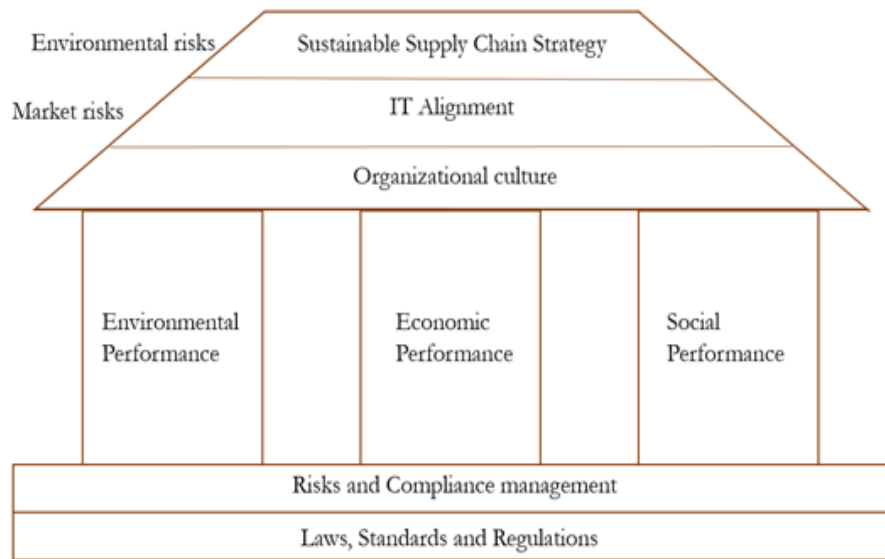


Figure 3. *The house of sustainable supply chain management* (Teuteberg and Witterstruch, 2010).

2.2.1 The importance of green supplier selection

The role of the purchasing department is increasing in aspects of an organization's business strategy and their aim of sustainability. A quote that pinpoints the importance of the entire chain being sustainable is by Krause, Vachon, and Klassen (2009):

“A company is no more sustainable than the suppliers that are selected and retained by the company” (Krause, Vachon, and Klassen, 2009 pp.18).

Purchasing with environmental focus has a strong effect on a firm performance positively in terms of net income (Carter, Kale and Grimm, 2000). Thus, managers need to recognize that improving environmental performance may improve economic performance and competitive opportunities, rather than something that is driving costs up (Carter, Kale, and Grimm, 2000; Genovese et al., 2013; Porter and van der Linde, 1995). Svensson and Wagner (2011) coined the term “transformative business sustainability”, which refers to a firm’s total effort to minimize the impact on the environment, e.g. in terms of carbon footprint, use of non-renewable or renewable sources and toxic substances. Business sustainability should be transformative to ensure dynamic and open-minded efforts. The model is applicable on the procurement departments to ensure flexible planning, implementation, and evaluation of environmental efforts.

According to Tate et al. (2012), the most powerful way of reaching environmental improvements is when supplier initiatives are coordinated through procurement departments. Moreover, it is essential that buying decisions regarding sustainable procurement are made from positions that have support from the board, especially in the case of economic crises. Other parameters than cost

savings need to constitute the basis of rewards to indicate that sustainable development is prioritized within the company. Therefore, organizations with goals regarding sustainability, e.g. carbon neutrality, require a procurement team with a strategic role (Svensson and Wagner, 2011).

In the implementation of changes towards sustainability strategies, the collaboration between firms (e.g. supplier and buyer) is essential (Bowen et al., 2001; Vachon and Klassen, 2006). Companies should cooperate with their suppliers by sharing knowledge in terms of value and benefits of working sustainable, to encourage them to take initiatives. This combined with regular contact between departments involved in the supply process enables the realization of environmental strategies (Bowen et al., 2001).

Winter and Lasch (2015) found that firms that considered sustainability as a part of its corporate objectives and had a department for sustainability, applied social and sustainable criteria in the pre-selection of suppliers and prioritized them, they used checklists and templates, and conducted supplier's audits compared to those that didn't have it incorporated. And a company's environmental goals should be integrated with its procurement activities, not only since procurement represents the beginning of the value chain (Walton et al., 1998) but also since the firm's strategies and priorities affect the weightings of the supplier evaluation criteria (Govindan et al., 2015). Both the relationship between economic performance and the impact of implementing environmental criteria within supplier selection (Luzzini et al., 2013) and linking green supplier selection to organizations' strategies (Igarashi et al., 2013) is empirically unexamined.

Winter and Lasch (2015) and Genovese et al. (2013) found that the traditional criteria; quality, price, and delivery are part of the final stage of supplier selection while social and environmental criteria are not. Instead, sustainability criteria are mostly applied as pre-qualification questions and verification of the suppliers' compliance rather than a basis for the final selection of suppliers. Social criteria have been shown to generally been more applied compared to environmental criteria, as it is complex to obtain suppliers environmental performance, and that is why sustainability criteria are mainly used during the pre-qualification stage rather than later in the final selection (Genovese et al., 2013). Moreover, the sustainability criteria are often based on standards and laws and are only evaluated as fulfilled or not by answering yes or no (Winter and Lasch, 2015). Govindan et al. (2015) found that the most firms evaluating and selecting green suppliers based on Environmental management systems, such as ISO14001. To guarantee well-grounded supplier selection decisions, companies should conduct sensitivity analyses. The analysis should consequently take sensitive data and change weights into account when selecting and evaluating suppliers and their environmental performance (Govindan et al., 2015).

Activities such as supplier selection, supplier certification, supplier involvement, and supplier development, are crucial in order to reach set goals and nurture trust between business partners (Cilberti et al., 2009). Lamming and Hampson (1996) argue that collaboration in practices such as contracting, supplier selection, and evaluation, can be useful when developing methods for collecting supplier information, characterizing the supply base, and communicating requirements to suppliers. To ensure that suppliers are operating accordance with the contract, regular evaluation and monitoring are essential (Svensson and Wagner, 2011).

2.3 Framework for carbon neutral purchasing

We have compiled the literature into a framework for organizations that want to become carbon neutral. There are several aspects to consider when transitioning from traditional SCM to SSCM, which must be fulfilled for an organization to be truly sustainable, see table 2. The framework is divided into two clusters which address the criteria from the perspective of the organization including the purchasing department and an external perspective including suppliers.

Table 2. *Criteria to procure carbon neutral.*

Organizational criteria
Norms (Pagell and Shevchenko, 2014).
Business model design (Hart and Milstein, 2003).
Centralized purchasing department with a strategic mindset to secure sustainable purchasing (Dubois and Pedersen, 2002; Hayes and Schmenner, 1978; Tate et al., 2012).
Positions within the purchasing department must have support from the board to be able to take carbon neutral decisions (Svensson and Wagner, 2011).
Measure/monitor (Pagell and Shevchenko, 2014; Svensson and Wagner, 2011).
Develop internal skills and capabilities (Hart and Milstein, 2003).
Clear vision defined in a roadmap with trade-offs, priorities, technological development, resource allocation (Skinner, 1969; Hayes and Schmenner, 1978).
Take sensitive data and changing weights into account when selecting and evaluating suppliers and their environmental performance (Govindan et al., 2015).
External criteria
Suppliers comply with code of conduct (Reuter et al., 2010).
Suppliers comply with triple bottom line (Reuter et al., 2010).
Search for new technologies and start-ups (Utterback, 1974; Hart and Milstein, 2003; Pagell and Shevchenko, 2014).
Supplier audits (Winter and Lash, 2015).
Supplier development (Gilbert et al., 2009; Pagell, Wu and Wasserman, 2010).
Collaboration between the entire supply chain (Ballou, 2007).

3. Procurement within the Swedish construction industry

This chapter briefly describes the construction industry and how sustainability is defined, the challenges the construction industry are facing and what is considered to be sustainable procurement today.

3.1 Carbon neutrality within the construction industry

In 2016 the Swedish authority for building environment and construction planning, Boverket, predicted that more than 700 000 houses must be built over a time period of 10 years (Boverket, 2016). At the same time, Sweden has signed the bill of achieving zero greenhouse gas emissions by the year of 2050 (Swedish Environmental Protection Agency, 2016). These two factors affect the construction industry, and must simultaneously be considered. There are three challenges the construction industry has in term of reaching the carbon neutrality by 2050. The first challenge is that the material being used can represent up to 78 % of the carbon emission in the construction process (The Swedish Construction Federation, 2016b). The second challenge is that the transports are dependent on fossil fuels like many other industries (Byggindustrin, 2016). The third challenge is that the industry uses big machinery with long service life and are therefore not often replaced (Byggindustrin, 2016). Maria Brogren, energy and environmental manager at the Swedish Construction Federation, argues that there is a need for information regarding the carbon emissions of all materials and products and that Environmental Product Declarations (EPD's) is a standard for reporting such information. In addition, use machines with lower carbon emission, which probably will be more expensive than existing machines since it is new technology, but need to be prioritized in the procurement. In addition, relevant requirements in the procurement process are essential (Byggindustrin, 2016).

The four leading construction companies in Sweden, NCC, Peab, JM and Skanska have all understood the importance of building environmentally friendly. However, Mokhlesian (2014) found that there is a lack of consensus regarding the definition of sustainability within the Swedish construction companies, which was evident in their annual reports:

- NCC has set a goal of reducing the carbon emissions by 50% by 2020, based on the levels from 2015 (NCC, 2015). Furthermore, NCC has developed a climate calculation program to make life cycle assessment of different methods. In this way, the customers can get information and choose the method with the lowest carbon emissions (NCC, 2016).
- Peab highlights the importance of reducing carbon emissions but has not presented a clear target for achieving the Government's vision. Nevertheless, the company has launched an eco-asphalt, made from bio-oil which is a carbon neutral residual product from the food industry. (Peab, 2016)
- JM has not presented a strategy or a goal in terms of reducing its carbon emissions. However, the company is a part of the Haga Initiative, a network that partly aims to reduce emissions by 40 % by 2020. (JM, 2017)

- Skanska is the construction company that mostly emphasizes the importance of reduced carbon emissions, by its vision of becoming carbon neutral by 2050. Skanska wants to be a pioneer in being a carbon neutral company (CDP Worldwide, 2016) and uses climate calculations to calculate each project's carbon emission and be able to categorize the project into their green color palette (Skanska, 2016).

Although the construction companies are working more sustainably, environmental aspects do rarely constitute the majority of the parameters considered in the construction projects (Gluch., 2005), which may be affected by the lack of empirical research regarding mandate and carbon neutral purchasing. There has been a resistance in the industry against change towards working in a more sustainable way, Gluch et al. (2007) identified several possible reasons for the resistance:

1. Employees within the industry believe that legislation will solve environmental issues.
2. Environmental goals are not, or inadequately, monitored.
3. There is no belief that there is a green market, which prevents green innovations.
4. The collaboration between parties in the construction process is lacking.
5. Lack of collaboration with environmental organizations and academia.

3.2 Laws and regulations

The construction industry uses both international and Swedish environmental classifications of buildings. The classifications' aim to present a building's environmental performance and it is a way of handling complex issues within the industry. LEED and BREEAM are the two most common international classifications, but several Swedish versions such as The Nordic Swan Ecolabel and Miljöbyggnad (Green Building) are applied (Research institutes of Sweden, nd; The Nordic Swan Ecolabel, 2012; Sweden Green Building Council, 2016).

In addition, there are several ISO-standards that address environmental aspects such as product life-cycles, environmental footprint and environmental management (International Organization for Standardization, nd) However, there are currently no international standards regarding how to consider environmental aspects or mandate when purchasing. In 2017, a new international standard for sustainable procurement, ISO 20400, will be launched (Swedish Standards Institute, 2016) which the construction industry can use as a guidance during procurement.

3.3 Green purchasing within the Swedish construction industry

Involving environmental requirements in construction contracts differs from the procurement of products since it is difficult to assess if suppliers will fulfill the requirements (Varnäs et al., 2007). Environmental preferences rather than requirements are applied in the Swedish construction industry in terms of both private and public procurement (Faith-Ell, 2005). Only "basic environmental requirements" have in general been applied, which includes mostly dealing with harmful substances (Swedish Environmental Management Council, 2001).

Varnäs et al. (2007) identified that the most common requirements in contracts within the Swedish construction industry are:

- Working environment.
- Harmful substances.
- Requirements regarding machines used.
- Environmental plan during construction works.
- Waste disposal during construction.
- Environmental management systems in the contractor's organization.

However, the application of these preferences is limited, as the monitoring often are bursting which leads to difficulties to prove overall environmental effectiveness (Faith-Ell et al., 2006; Erlandsson, 2006). There is no clear answer explaining why the application of environmental procurement requirements is limited but lack of clear mandate can be a missing link. Varnäs et al. (2007) have identified that possible reasons could be lack of knowledge regarding involving environmental requirements and concerns in terms of increased cost and limitation for the project. Another barrier is that Swedish construction companies use the same supplier for projects that are classified as green or conventional projects (Mokhlesian, 2014). According to Sterner (2002), clients find it complex to evaluate their impacts on the environment. As a result, the application of requirements within the industry is inefficient due to lack of information transfer and systematically follow-up. Effective follow-up routines and clearer and simpler requirements are therefore needed to make green procurement more effective (Faith-Ell et al., 2006).

4. Research method

This section describes the research design of the study, how primary and secondary data have been collected and the quality of the study.

4.1 Research design

The purpose of the thesis is to investigate the importance of mandate and how it affects carbon neutral purchasing. The topic has been studied sparsely in previous research and the authors aim to fill the gap in the literature. The study was therefore conducted with an *exploratory approach* to investigate where in the organization mandate must be given to enable carbon neutral purchases and to understand the relations between purchasing carbon neutral and mandate (Collis and Hussey, 2014). A case study was conducted at Skanska since the company aims to become carbon neutral by 2050. According to Blomkvist and Hallin (2014) are case studies are suitable for complex phenomenon.

Skanska has identified a gap in their procurement processes regarding their sustainability goal and wants to explore the opportunities to include climate decisions. The research was initiated by a meeting with two representatives from Skanska. The aim was to introduce us to Skanska's ambition to become carbon neutral and their current situation, and give some context and background to this study. Next, a pre-study was done to understand how a purchaser buys products in Skanska's systems. Later, several interviews with key employers at Skanska were conducted to understand the processes of prequalification of suppliers, the sourcing process and the interaction between different departments within Skanska. To complement the interviews, a screening of Skanska's intranet documents and publications was done.

In general, the research process has been iterative and is shown in figure 4. As the scope of the study often changed through the investigation, we wanted to be able to adapt to more interesting subjects during the research process.

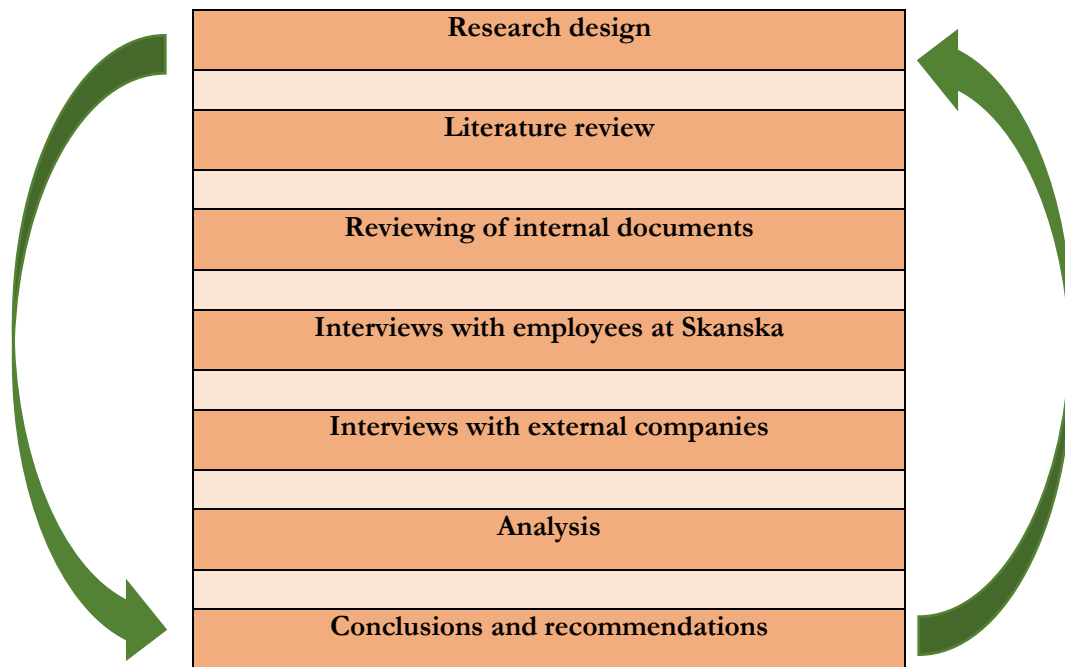


Figure 4. *The investigation's research process.*

4.2 Literature review

A literature study was conducted in order to understand and gain insights regarding procurement processes and how organizations may procure carbon neutral. Literature was reviewed during the whole research process and was narrowed down into three parts; supply chain management, sustainable supply chain management and green supplier selection, which constituted a foundation for the understanding of Skanska's current situation and essential parameters to become carbon neutral. The literature review contributed to the development of a checklist of criteria that an organization needs to fulfill to become carbon neutral. A literature gap was identified regarding the importance of mandate in an organization when transforming from a traditional to a sustainable supply chain. To find the literature, search engines such as Google Scholar and KTH Primo were used where information was retrieved from relevant reports and articles, e.g. reports that have been peer-reviewed.

Keywords: "*Sustainability*", "*Supply chain management*" "*Sustainable supply chain management*", "*Procurement process*", "*Green supply chain management*", "*Green supplier selection*", "*Environmental criteria*", "*Mandate within the procurement*", "*Mandate within the sourcing process*"

4.3 Data collection

The majority of the collected data have been of *qualitative character* since the purpose of the study has been to provide a contextualized understanding of how mandate within an organization affects carbon neutral purchasing. A company procurement process is rarely presented to the public, hence, interviews with employees at Skanska constitutes a significant part of the data collection. Primary data have mainly been conducted by interviews and observations while articles, reports, and internal documents from Skanska represent sources of secondary data. To reduce the bias with our qualitative investigation, multiple data sources, e.g. triangulation, is used to get a broader and deeper understanding of the procurement processes (Collis and Hussey, 2014).

4.3.1 Pre-study

A pre-study was conducted in order to determine how organizations involve climate decision in their procurement process and the importance of mandate. The pre-study consisted of three interviews, see table 3, each approximately one hour long. One interview was held with a category purchaser at Skanska to understand how the procurement processes at Skanska works, while the other two interviews were held with external employees from other companies and industries. The companies were chosen from a report conducted by the CDP, which is a global organization that discloses information about companies, states, and regions environmental impact (CDP, 2017). The chosen companies have been recognized by their sustainable activities and provided expertise regarding how to involve climate decisions in procurement process. The interviewees in the pre-study agreed to be interviewed and were informed about the purpose of the study, and the information was treated confidentially.

Table 3. *Interviewees in the pre-study.*

Date	Position	Form
2017-01-31	Category purchaser	Live
2017-03-07	Category manager/Strategic sourcing (External)	Skype
2017-03-29	Head of sustainability (External)	Live

4.3.2 Interviews

As stated above, interviews have stood for the majority of the study's gathered empirical data. Several live and online interviews were conducted internally to understand Skanska's procurement processes. The aim of the interviews was to identify patterns and relationships in the empiric findings to understand the interviewee's subjective thoughts of the procurement processes (Blomkvist and Hallin, 2015; Collis and Hussey, 2014).

In order to get a holistic view of the company's procurement department and the procurement process, several employees with different positions were interviewed. The selection of interviewees, see table 4, was based on the employee's expertise within different areas, in which they all had knowledge about the sourcing process. This together with the recommendations from supervisors narrowed down the scope. The combination of the different roles was considered to contribute with different perspectives and thus a deeper understanding of the procurement process. Some interviewees got their questions sent before the interview which increased the

quality of the interviews, and they had the opportunity to neglect questions they did not want to answer. All interviewees were informed of the purpose of the interview and accepted to participate.

The interviews were semi-structured in order to get qualitative responses (Collis and Hussey, 2014). Open ended questions, such as “who, what, how and why” can lead to interesting topics and findings as the interviewee can interpret the questions (Yin, 2009). The interviews were all approximately one hour and held in Swedish and all quotes in the report are thus translated into English.

Table 4. *The interviewees.*

Date	Position	Form
2017-04-10	Purchasing director	Live
2017-02-01	Head of Nordic sourcing management	Live
2017-02-08	Development Leader Purchasing, scouring board	Live
2017-03-22	Head of Supplier Management	Skype
2017-02-07	Partnering Leader Supplier	Live
2017-02-08	Sustainable development Manager	Skype
2017-03-13	Group Manager of energy	Skype
2017-03-29	Sustainable development Leader	Live
2017-03-28	Project Manager Supplier Development	Live
2017-03-27	International purchaser	Live
2017-04-10	Head of sustainability	Skype
2017-04-11	Head of category X	Live
2017-04-11	Head of category Y	Live
2017-03-27	Portfolio manager	Skype
2017-04-11	Portfolio manager	Live
2017-03-05	Category manager	Live
2017-03-07	Category manager	Live
2017-03-21	Category manager	Skype

2017-03-21	Category manager	Live
2017-04-03	Category manager	Skype
2017-04-03	Category manager	Skype

4.3.3 Observations

To investigate the sourcing process and factors that affect the decision-making participant observation was used, which constituted the second main method. The method was chosen to complement the interviews in order to fully understand Skanska's sourcing process and had the aim to systematically observe and document sourcing cases at the company over a longer time period. Since the time was limited, only two sourcing cases were observed. The observations were documented carefully and differentiated in first and second order of construct, focusing on first order of construct since it is a true documentation of reality. However, second order of construct was documented for later analysis (Blomkvist and Hallin, 2015).

4.4 Quality of analysis

The quality of analysis is assessed below from the three aspects validity, reliability, generalizability and ethics.

4.4.1 Validity

Throughout the study the complexity of the work have become clearer as it has progressed, we have studied the phenomena mandate within its context of the procurement department (Gibbert et al., 2008). The combination of the data collection, method, interviews and observations has increased the validity of the study as the same results were found independent of the method (Collis and Hussey, 2014). As previously mentioned, the process was iterative to ensure that the questions were corresponding to the scope of the research and well-grounded in the literature.

To increase the validity further, most of the interviews were held with employees that are using or are responsible for some part of the procurement process. This gave us a deep understanding of the challenges with carbon neutrality as we could investigate a real-world context (Eisenhardt and Graebner, 2007). During the interviews with employees from the procurement department, we got information regarding other departments within Skanska.

To complement the study with their understanding of the purpose and get input how Skanska should purchase carbon neutral, four interviews were conducted with employees from other departments with different areas of expertise. According to Collis and Hussey (2014) this increases the validity of the report.

All interviewees were also informed about the study's purpose and introduced to the background of it to increase the validity (Collis and Hussey, 2014). A disadvantage with semi-structured interviews could imply that questions are not answered or understood correctly (Blomkvist and Hallin, 2015) and to overcome this, unclear questions were repeated or reformulated for the interviewee. The answers were treated confidentially by codification of their names and the general questions can be found in appendix, which increases the possibility of achieving the same result. All interviewees approved that the interviews were recorded, to support the interview, notes were taken to ensure that together with the transcription the answers were rightfully interpreted.

4.4.2 Reliability

Collis and Hussey (2014) argue that a qualitative method has low reliability due to the semi-structured interviews that captures the interviewee's subjective belief of reality. Further, the open-ended questions led to discussions outside the scope, indicating that there is a low probability that another researcher would get the exact same results as this study. Contrary, Eisenhardt and Graebner (2007) highlights that the purpose of a single case is to investigate opportunities within its context. To increase the reliability, the collected data has been analyzed respectfully and in an unbiased manner. According to Patel and Davidsson (1994) the reliability of the interviews is increased if the interview is conducted by two people. To increase our understanding of the interviewee's answer we were always two when conducting the interviews, one were responsible for asking the questions while the other took notes. Later, the data was analyzed together, written separately, and lastly discussed together.

Multiple interviews regarding the same topics were held to get different and deeper perspectives of the phenomenon. To increase the reliability and generalization of the result, the interview questions were open-ended and the findings were categorized into three different areas, to be able to draw conclusions and find similarities from the literature and theory. The data that has been collected from Skanska's intranet is not possible to access if the researcher is not employed by Skanska which decreases the reliability of the report. All other secondary data is however referred to in the thesis which makes it possible to find the source of origin.

4.4.3 Generalizability

The purpose of the interviews was to get a deeper understanding of how companies evaluate and decide on which suppliers to have in their registry of potential suppliers. Even though the research was done at one company, the analysis was done on a higher strategic level with the aim to achieve results that could be applicable to similar procurement processes. A major part of the questions asked during the interviews are applicable at purchasing departments within other industries which increases the generalizability.

4.4.4 Ethics

A scientific work in social sciences has to meet four ethical requirements according to Blomkvist and Hallin (2015); the information, the consent, the confidentiality and the good use requirement. The information and the consent requirement was fulfilled in this study since all observed and interviewed people was informed about the purpose of the study and agreed to be interviewed or observed before the interview were conducted. Any information that can harm the interviewee or the company was not disclosed or discussed with others, which fulfilled the confidentiality requirement (Bell and Bryman, 2007). Furthermore, the collected material was only used for the stated purpose of the investigation which therefore fulfilled the good use requirement.

5. Findings

This chapter describes the findings from the interviews with the case company. First, the existing organization and process is presented and then the findings regarding the role of mandate are presented.

5.1 Existing organization and process

This section describes Skanska's current processes and is divided into three areas; aiming for a carbon neutral society, existing collaboration within Skanska and standardized sourcing process.

5.1.1 Aiming for a carbon neutral society

The employees at Skanska are proud of their goal of becoming carbon neutral (Interviewee Q; Interviewee M; Interviewee C). An employee at Skanska said:

“Sustainability may cost what it cost, but from a public perspective- sustainability is a saving” (Interviewee Q).

The interviewees had a positive attitude on having a long-term relationship with suppliers, as the relationship would give Skanska an outside-in perspective in their work. As well as being up-to-date with the innovations in terms of both new technology and materials to internally improve and prepare Skanska for the future (Interviewee F).

Skanska has started to collaborate with their suppliers to increase their knowledge in terms of minimizing their carbon emission (Interviewee M; Interviewee R). In addition, the construction industry has forums where they discuss sustainable solutions as they all see the benefits with working more sustainable and not competing on the green aspects (Interviewee M). Skanska has one employee that attends these meetings.

5.1.2 Existing collaboration within Skanska

Skanska is divided into three operational areas; construction, residential and commercial property development, and infrastructure development. Historically, Skanska has had a decentralized purchasing organization where the line organization was responsible for all purchases. Around 10 to 15 years ago, Skanska decided to become more centralized within the purchasing department and begun with a standardized sourcing process (Interviewee Q). The line organization can make purchases by their own and can use suppliers that the Nordic Procurement Unit (NPU) has agreements with or not. On the other hand, the NPU can only suggest suppliers for the project purchasing, but does not choose which suppliers the projects should use (Interviewee Q; Interviewee G; Interviewee P; Interviewee T; Interviewee B).

The NPU gets support from specialists within areas outside the purchasing department for example from sustainable business development, technology, health and safety department, HR, and communications. In figure 5, the structure of the organization and the operational areas that use the sourcing process, which is a part of the NPU, and some of the functions that help and

guide the NPU in the sourcing process are presented. The interviewees all agreed that it is every department's own responsibility to implement a carbon neutral strategy and they all needed to seek new innovations and production methods.

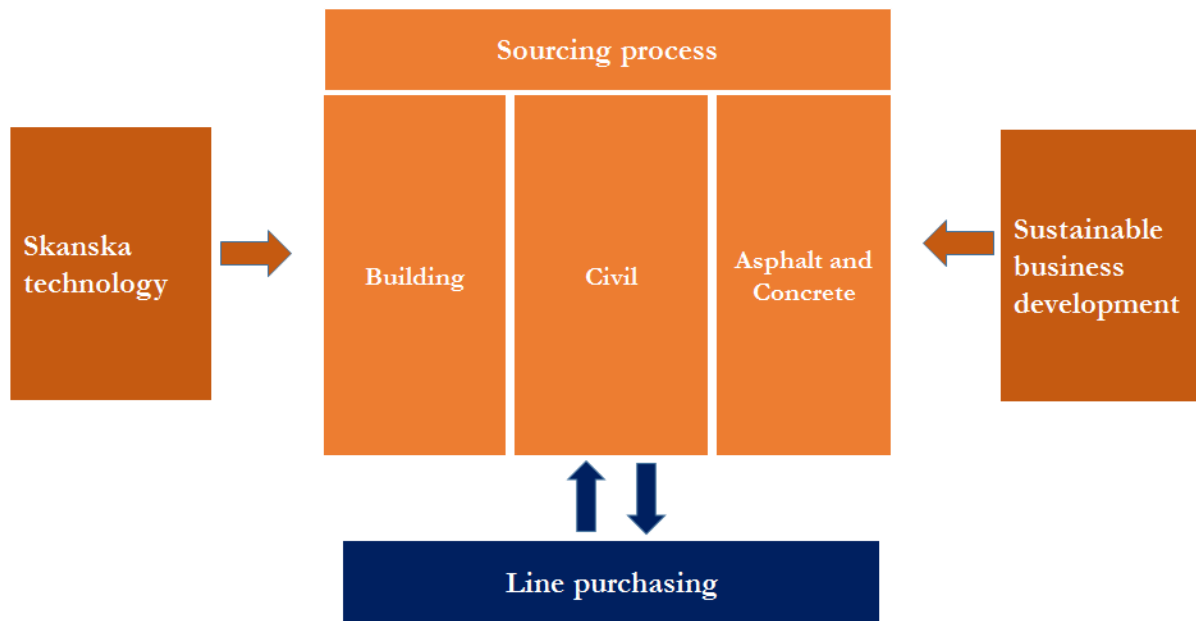


Figure 5. *Departments that influences the purchasing department.*

The sustainable business development department is responsible for informing the projects and the NPU about green innovations. To inform the projects each region has an employee that help them broaden their green perspective and formulate green strategies (Interviewee T; Interviewee M). The NPU is also responsible of informing the projects about new innovations from the suppliers and their competitors (Interviewees C; Interviewee M).

An NPU Green team have been developed to act as an advisory and advocacy forum in terms of carbon neutral purchasing (Interviewee C; Interviewee G). The group have mapped categories with the highest carbon impact and held workshops with categories to communicate the measures they will have to take in order to become carbon neutral by 2050 (Interviewee C).

Furthermore, the sustainable business development department is currently mapping educational needs within the organization to raise the competence (Interviewee M) and employees can contact the department through the intranet if they have any question regarding sustainable purchasing, or anything that has with carbon neutrality to do. To spread the information, some category managers work closely with the line organization to cooperate and educate them. It is an exchange of information in terms of projects daily activities and work (Interviewee K). The result of the exchange is to bring the NPU and the line organization closer to each other and work as one unit. Moreover, good examples of both purchasing and green suppliers are shared in informal settings (Interviewee B). Many employees are satisfied with Skanska and stay many years and therefore the knowledge the employees developed stays within Skanska (Interviewee R).

5.1.3 Standardized sourcing process

The sourcing process consists of five tollgates, ranging from deciding the categories strategy to evaluate the supplier, see figure 6. In the sourcing process, existing and new sourcing cases are being discussed.

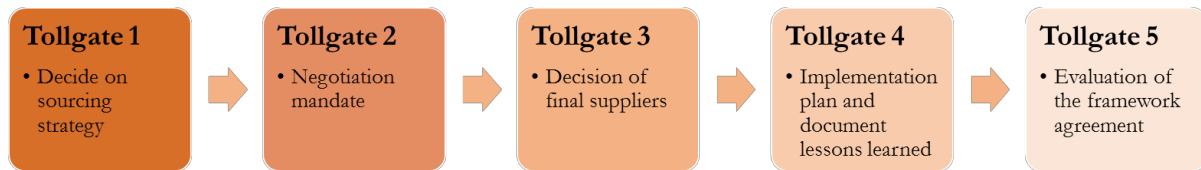


Figure 6. *Tollgates* (Skanska).

For a supplier to be considered in the sourcing processes, it needs to pass the pre-qualification. In some cases, an audit is being conducted where the selection is based on the suppliers with the highest cost (Interviewee R; Interviewee A) or the highest risk (Interviewee E). Today, only two categories aim to conduct audits with all its suppliers when developing agreements (Interviewee K; Interviewee F).

Carbon emissions are currently not taken into consideration in the pre-qualification or in the audits. Only one category is currently taking their annual CO₂ load into account by using Environmental Product Declaration (EPD), which is a verified document for communicating a product's environmental performance (Interviewee N). In figure 7 the three different areas, green, safety and ethics, which the Sourcing Board considers during the sourcing process is presented. For each area, one member of the Sourcing board is responsible for asking questions to ensure that the category manager has investigated the markets.



Figure 7. *Parameters presented during Tollgate 1* (Skanska).

Furthermore, Skanska has a segmentation model that indicates which suppliers they should collaborate and work with during projects, see figure 8. The segmentation model has recently been updated and those suppliers with climate risks cannot become “Approved” if the risk is not managed and should therefore not be used. In the new segmentation model of suppliers there is no carbon neutrality aspects included in the process. All purchases are made in a purchasing system, which has information about supplier’s pre-qualification status, if Skanska has a framework agreement with the suppliers, and which segment the supplier corresponds to (Interviewee I).

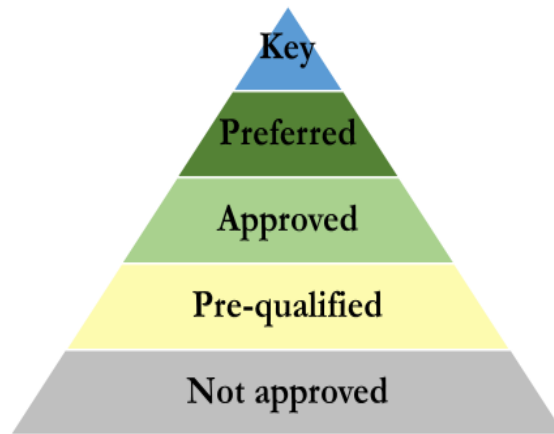














Figure 8. *Skanska's segmentation of suppliers* (Skanska).

5.1.4 Criteria to procure carbon neutral

The framework from chapter 2.3 has been developed based on the existing literature regarding SSCM and the findings from the interviews. Skanska has fulfilled some of the criteria of transforming from a traditional supply chain to a sustainable supply chain, see table 5. Those criteria that Skanska has met are assigned with a ● while those that Skanska only has started to implement or have processes that they bypass are assigned with a ◐. And the criteria that Skanska currently doesn't have is assigned with a ○.

Table 5. Skanska's current state.

Criteria	Criteria Skanska has fulfilled
Organizational criteria	
Norms (Pagell and Shevchenko, 2014).	
Business model design (Hart and Milstein, 2003).	
Centralized purchasing department with a strategic mindset to secure sustainable purchasing (Dubois and Pedersen, 2002; Hayes and Schmenner, 1978; Tate et al., 2012).	
Positions within the purchasing department must have support from the board to be able to take carbon neutral decisions (Svensson and Wagner, 2011).	
Measure/monitor (Pagell and Shevchenko, 2014; Svensson and Wagner, 2011).	
Develop internal skills and capabilities (Hart and Milstein, 2003).	
Clear vision defined in a roadmap with trade-offs, priorities, technological development, resource allocation (Skinner, 1969; Hayes and Schmenner, 1978).	
Take sensitive data and changing weights into account when selecting and evaluating suppliers and their environmental performance (Govindan et al. 2015).	
Clear purchasing guideline.	
External criteria	
Suppliers comply with code of conduct (Reuter et al., 2010).	
Suppliers comply with triple bottom line (Reuter et al., 2010).	
Search for new technologies and start-ups (Utterback, 1974; Hart and Milstein, 2003; Pagell and Shevchenko, 2014).	
Supplier audits (Winter and Lash, 2015).	
Supplier development (Gilbert et al., 2009; Pagell, Wu and Wasserman 2010).	
Collaboration between the entire supply chain (Ballou, 2007).	

5.2 Lack of mandate

Skanska's procurement process is well designed and applies some of the criteria that existing literature have written about SSCM, see table 5. This section presents the findings from the perspective of mandate, which clarifies why the procurement process will not secure a carbon neutral supplier base unless clear mandates exist within the NPU department. We have found that Skanska is currently working on some of the criteria for a sustainable supply chain but they do not go all the way in their strategy of becoming carbon neutral. Moreover, this is due to the lack of mandate in the procurement processes, which have not been studied in the procurement literature.

5.2.1 Industry

The construction industry is quite conservative in terms of making business (Interviewee E; Interviewee K). One interviewee (Interviewee B) argued that it is problematic to offer greener solutions in public procurement since the public sector often chooses the offer with the lowest cost and is most accurate in terms of their requirements. As the public sector is one of the organization's largest customers, the shift to building more sustainable is being slowed down.

Skanska has an extremely large supplier base and uses small, local suppliers (Interviewee U). Specific categories have numerous suppliers, which makes it impossible to develop framework agreements within these categories, preventing Skanska to control their suppliers (Interviewee A). According to interviewee K, Skanska must consolidate the supply base so that they have more volume to work with fewer suppliers and thereby keep reasonable prices. The customer is in general more interested in the short-term perspective, e.g. the cost per product, rather than the long-term perspective e.g. saving money in the long-term by investing in the latest innovations. According to interviewee E, the construction industry has common standards that the customers are used to. This makes it harder for Skanska to set higher standards when there is no other construction company that pushes the market together with Skanska.

Currently, it is complex for suppliers to understand what Skanska are prioritizing as they must read 15 different documents and pass 11 links on the web page to get access to all information regarding suppliers (Skanska, 2017). In addition, the requirements for project specific procurement and framework agreements are not consistent (Interviewee A; Interviewee M) which contributes to a shared view of the company's priorities as suppliers are treated differently depending on the agreement.

Interviewee I want to require higher demands from the suppliers while Interviewee T is worried about not imposing demands in an effective way. Higher demands can be included in e.g. the self-assessment, however, employees are concerned about including too many questions since it will become irrelevant to some suppliers (Interviewee M). Many suppliers do not have information regarding carbon emissions since the construction industry does not request it. A demand for carbon emission information can therefore be challenging for small suppliers that constitute a large part of the company's suppliers.

Higher requirements could also lead to fewer available suppliers if the supplier cannot fulfill the agreement. This would become too risky for Skanska as they would lose projects (Interviewee R; Interviewee N) as one employee said:

“We will not succeed without our customer” (Interviewee T).

It is also complex to set standards regarding how to follow-up environmental requirements (Interviewee M; Interviewee U). A common issue is that basic data is available but does not create value as it seldom is structured (Interviewee K).

5.2.2 Mandate within the organization

In 2015, the management team decided that Skanska should be carbon neutral by 2050. This came as a surprise to some of the employees since Skanska typically does not take such sudden decisions (Interviewee Q). Since the goal of reaching carbon neutrality is in its beginning (Interviewee C). Employees at the procurement department believe that it is the CEO, management team, the green department, the sales department or that the ownership is the different operational areas that are responsible for implementing the actions to reach target (Interviewee P; Interviewee T; Interviewee B; Interviewee O).

Almost all interviewees stated that the initiative is a step in the right direction but there are big doubts regarding how to achieve the target. Many interviewees argue that there has been little information from the management team and that they are waiting for a plan to reach the goal (Interviewee G; Interviewee M; Interviewee Q; Interviewee F), as there is no official strategy in terms of how to consider carbon emissions (Interviewee N). One interviewee claimed that the climate aspect will become more natural when the line organization promotes the issue to the suppliers, as the vision is currently being operated as a sidetrack (Interviewee C).

This has led to uncertainty within the procurement department, as they do not know what decisions they can take. Interviewee I, argued that it is difficult to purchase carbon neutral, as there is nothing documented and no guidelines regarding this kind of purchasing. However, Skanska UK and Norway have developed guidelines based on the new ISO 20400 and the Swedish procurement department could learn from them (Interviewee C). The green department at Skanska has given some directions to the procurement department but consider that the department needs to take active decisions themselves, and not wait for other functions within the organization to come up with guidelines (Interviewee T).

Mandate within the Sourcing Board

Even though the sourcing process is standardized, it is not followed through. During an observation of Tollgate 1 (present the category strategy), a purchaser asked the Sourcing Board if they could skip Tollgate 2 (Sourcing Board gives the mandate to negotiate) and instead come back and present Tollgate 3 (final decisions of suppliers). Tollgate 2 is informally considered optional (Interviewee G), and interviewee Q highlighted that category manager and purchasers are systematically bypassing the process to make the process more efficient. The sourcing process has

five tollgates, which is experienced as a heavy process and therefore the Sourcing Board gives the mandate to the category team to choose suppliers they want to negotiate with based on their own judgment (Interviewee P).

In addition, the intranet does not always illustrate Tollgate 5 (evaluation), which indicates that only tollgate 1 to tollgate 4 is of relevance. Interviewees argued that Tollgate 5 is sparsely carried out, which goes in line with the author's own observations. If the tollgate is conducted; price, cost reduction, and major discrepancies are parameters that are being followed up. However, Interviewee E wants Skanska to notice minor abnormalities to indicate for the suppliers that Skanska's requirements are important to follow.

Interviewees C and Interviewee Q agreed that Tollgate 1 should be the stage where carbon emissions should be controlled, as it is the first phase in the process of developing a category strategy. They argue that it will be too late to start controlling the emissions in the later tollgates since potential suppliers are being selected during Tollgate 2 and 3. In figure 9 the current and the theoretical level of engagement in the Sourcing Board are visualized which shows that most emphasis is put on Tollgate 3, which is the phase of the final selection of suppliers.

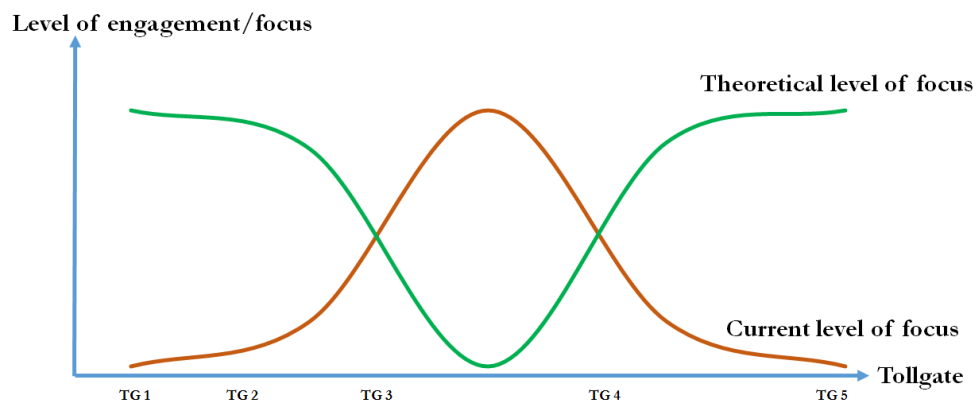


Figure 9. *Level of engagement in the sourcing process.*

The discussions during each tollgate lack structure. Several interviewees argued that the members of the Sourcing Board often discuss ambiguities regarding the presentation material during the presentations, rather than the actual business case and sustainability issues (Interviewee Q). The material is being sent to the Sourcing Board three days before the presentation, so the members should be familiar with the material during the presentation, and if there are any uncertainties the board can talk to the category team before the presentation. Additionally, the presentation has limited time and many interviewees agreed that the discussion often is stressful (Interviewee C; Interviewee Q; Interviewee P).

To ensure that all environmental aspects are being taken into consideration, the category teams are supposed to discuss with the sustainable business developer. However, this is not being controlled today, as it is not being prioritized in the process. Currently, there is only one Sourcing Board member responsible for asking green related questions, and the process is dependent on this member's presence (Interviewee Q).

Today the questions do not focus on carbon emissions and there is no standardization of the questions (Interviewee S). This is a barrier since important aspects can be forgotten, as they are not brought up during the meeting, due to no prioritization during the presentation (Interviewee C). Several interviewees stated that the Sourcing Board wants to put pressure on the suppliers and develop agreements that have high requirements. However, they are highly concerned about the line organization's response since the agreements will not be used if both the suppliers and end consumer experience the requirements too high. The strategic sourcing process itself has to guarantee that risks such as high carbon emissions are taken into consideration (Interviewee C). Interviewees Q and Interviewee S questioned the focus of the sourcing meetings and if the structure of the Sourcing Board is adequate to the new focus on carbon neutrality.

Cost - the most important parameter

Today the intranet communicate that the cost is the most important aspect to consider when purchasing. Risks such as safety, ethics and green are only described on a strategic level which makes it hard for the employees to understand if carbon neutrality is prioritized in Skanska's strategy.

When the category team plans their category strategy, they can decide to have suppliers with low carbon emissions. But, as it is the project's purchaser that chooses supplier, they must be willing to choose products from these suppliers (Interviewee B). Several suppliers have green solutions available, but current taxes and regulatory systems sometimes promote other selections. In some cases, the project manager receives a higher tax refund by choosing the option with higher emissions (Interviewee B). The interviewee agrees that emissions will be easier to take into account in the future when the taxes and laws will be implemented in the society. As the customer often has a general idea about environmental issues, they want to have sustainable choices but they are rarely willing to pay extra for it (Interviewee K). The procurement department is concerned that having higher demands may result in less competitiveness and the clients will consider the price too high. Instead, the interviewees argue that Skanska should wait until the customers are more willing to buy greener solutions (Interviewee O; Interviewee P; Interviewee B).

According to Interviewees P and Interviewee Q, the Sourcing Board should evaluate offers by a lifecycle cost perspective. Many interviewees mentioned that they were concerned about the phenomena that suppliers with lower carbon emissions result in greater costs. The concern is mainly based on the employee's belief that the organization is not mature and that it only is appropriate to pursue the goal visionary (Interviewee I). The price of the product has traditionally been the focus and several interviewees considered it problematic as they miss savings in a broader perspective, which most likely is of relevance for the customer as well. A product may be more

expensive to buy, but it may generate savings in the end (Interviewee P).

Until now, only one sourcing case have had two suppliers with major differences in terms of carbon emissions, where one option is to choose a supplier with less carbon emissions to a higher price while the other option is to choose a supplier with higher emissions to a lower price. The Sourcing Board is unsure about their mandate to sign an agreement with the suppliers with higher cost and lower carbon emission (Interviewee C; Interviewee I).

What gets measured is what is being done

Historically, Skanska has measured how much of the purchases made by the NPU and by the projects by naming them differently. All purchases done by the NPU were defined as coordinated while the projects purchasing were not defined. This measurement and the new structure of the purchasing department made the culture at Skanska scattered as it became “them against us” (Interviewee Q). Today, Skanska measures purchasing based on the purchaser’s knowledge by having the right mandate. The organization has defined three types of purchasing, see figure 10:

1. NPU: When NPU purchase.
2. Project: When line organization purchase.
3. Uncoordinated purchase: When someone with lower mandate purchases a product that requires higher mandate than they actually have (Interviewee Q) or buying products from not pre-qualified suppliers (Interviewee E).

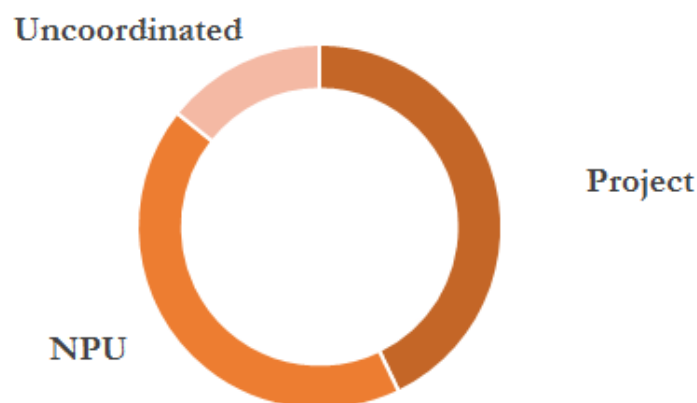


Figure 10. *The different categorized purchases (Skanska).*





The uncoordinated purchasing is possible as the projects need to proceed and there is no controlling of which suppliers the purchaser uses (Interviewee Q). In some smaller projects, there is no purchaser and the purchases are instead made by employees with other positions (Interviewee N). A purchaser can use suppliers that are not covered by an agreement, not approved or pre-qualified, without any consequences (Interviewee U), see figure 10 for uncoordinated purchasing. Not all suppliers that Skanska use are covered by a framework agreement (Interviewee A; Interviewee C; Interviewee M). The framework agreements should be prioritized in a project, however, project specific procurement can be made if a framework agreement is not feasible.

The line organization decides which suppliers they want to use for each project, and materials and products can theoretically be ordered from all existing suppliers on the market which makes the process complex (Interviewee U; Interviewee R; Interviewee O; Interviewee G).

According to Skanska’s spend in 2016, see figure 11, it is evident that the employees bypass the processes. In 2016, 43% were dark green, 27% were green, 9% were yellow, 1% red and 20% were not pre-qualified (Interviewee E), table 6 presents the signification of each color. Previously, the company bought 40% from red suppliers and one interviewee highlighted that:

“Not knowing is incredibly much better than to know that they are not approved” (Interviewee E).

Table 6. *The outcome of self-assessment (Skanska).*

Outcome of self-assessment	
	All Skanska Sweden’s requirements are fulfilled.
	The supplier fulfills almost all Skanska Sweden’s requirements.
	Legal requirements are fulfilled but Skanska Sweden’s requirements are not.
	The supplier does not fulfill legal requirements.

■ Dark green ■ Green ■ Yellow ■ Red ■ Unknown

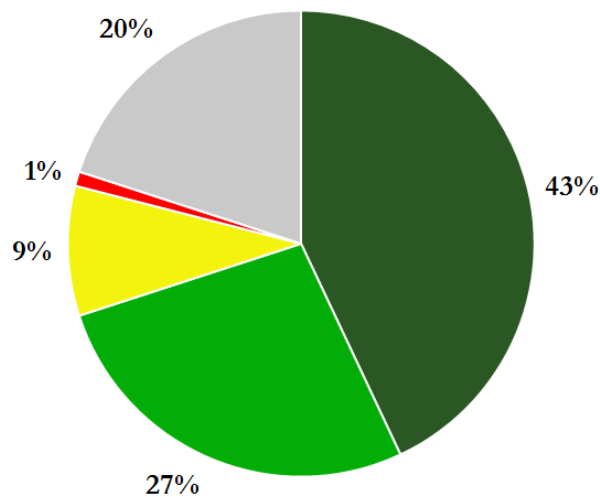


Figure 11. *Percentage of Skanska’s spend during 2016 (Skanska).*

Skanska is measuring contract loyalty, which indicates to which extent agreements are used and followed. Each agreement must be well developed and useful otherwise the line purchaser will not use them, as they do not consider it suitable for the project (Interviewee B).

5.2.3 No mandate of driving improvements

Today, there is no official process or tool that can handle employee's suggestions or ideas regarding environmental improvements (Interviewee A). Category purchasers and managers have a mass of knowledge in terms of the market and products but do not have the mandate to develop the requirements themselves. One interviewee stated that the processing time was very long and wanted to accelerate the process by getting the mandate to take own initiatives (Interviewee A).

Since the organization is decentralized it is also difficult to spread information (Interviewee M). This is seen in the project evaluation, as badly evaluated suppliers continue to be used in other projects (Interviewee U). Many of the interviewees think it is hard to share knowledge regarding carbon neutral purchasing, as there is no good IT-system to shares the knowledge.

6. Discussion

In this chapter the findings are discussed on three different levels, first the knowledge sharing within the organization, then the mandate within the procurement department, i.e. the vertical mandate, and last the horizontal mandate which is the mandate within different function and departments is discussed. The findings are presented with recommendations. A reflection on the reports robustness and its limitations are discussed.

6.1 Discussion of findings and future recommendations

The purpose of the study is to investigate how mandate within an organization affects carbon neutral purchasing, our recommendations for a construction company is seen in appendix C. It is highly relevant to understand that the recommendations we are giving are based on the lack of mandate. We cannot guarantee that companies will achieve carbon neutral targets by implementing clear mandates within the organization, but it is evident that it is a missing link in terms of reaching the target. This section will present our recommendations for companies to achieve all criteria in the framework, see table 5.

6.1.1 Knowledge sharing within the organization

One main finding was lack of internal communication of knowledge. The case company has a well-developed intranet which includes guidelines for the employees in their everyday work. However, since the implementation of the commitment of becoming carbon neutral, the intranet hasn't changed and is still communicating that cost per product is the most important aspect to consider when evaluating suppliers and the project. Due to the cost per product mindset, the employees don't know their mandate when making decisions that are better for the environment. This selection method partly correlates with the purchasing priorities of Kraljic (1983) cost, quality, delivery, and flexibility.

The vision has not been clearly communicated which constitutes a big barrier of reaching the goal (Hart and Milstein, 2003). As no one knows who will take responsibility for the change. To develop a sustainable supply chain the vision must be clearly articulated with guidelines so an organization can handle the daily business and simultaneously prepare for the future by having organizational priorities (Hart and Milstein, 2003). To help the employees overcome the uncertainties of taking the "wrong" decisions, a step in the right direction is to communicate that the company's carbon neutrality strategy is prioritized. Additionally, the trade-off the organization is willing to take should also be communicated. First then will the vision become operational and implemented.

Based on the findings it is shown that the organizational structure within the procurement department becomes an issue when they work towards Skanska's vision of becoming carbon neutral. Due to the fact that the procurement department does not have the ownership of the question or the mandate to guarantee that the vision becomes implemented, the actual owner of the vision with the current organizational structure is the line organization. For a strategy to become successful the firm needs to make a roadmap with clear organizational priorities (Hart and Milstein, 2003) as there are trade-offs, and this must be clearly communicated (Skinner, 1969; Hay

and Schmenner, 1978) as it will affect the supplier selection (Govindan et al., 2015). As the procurement activities are the beginning of the value chain (Walton et al., 1998) the procurement needs to have clear instructions that carbon neutrality is the most important, so that they feel like they have the mandate to make trade-off in terms of a more sustainable supplier rather than a cheaper one.

Big companies as Skanska has many different departments with specialist functions and the knowledge can be captured within these departments, as there is no good database the employees easily can access. As there is no database, the employees do not have data to support their carbon neutral decisions. Instead, the employees need to have a personal interest and seek the right people with the right knowledge. This process puts pressure on a personal level and if the interest does not exist. However, as many employees are satisfied with Skanska and stay many years and therefore the knowledge the employees developed stays within Skanska (Interviewee R). As the internal skills and capabilities remains within Skanska, this help the organization to manage the daily business effectively (Hart and Milstein, 2003). The organizations will lose opportunities of choosing more carbon neutral methods and materials. To help the employees make better carbon neutral purchases, we argue that companies has three possibilities.

The first is to develop clear areas of responsibilities for each position, which the sustainable business development department has started to do. In each role description, the employees they are dependent on should be explicitly written out. If someone changes job position, the successor will know which employees to contact. According to Svensson and Wagner (2011), it is essential that decisions are made from positions and has support from the board, which in Skanska's case means that the category manager needs mandate to negotiate with suppliers with lower carbon emissions, especially in economic difficulties.

The second action organizations need to take is to clearly communicate what kind of mandate each position has, and it should be clearly defined which processes they need to go through before they can take certain decisions.

The third action is to invest in tools that visualize both different methods and materials impact on a project, and thus give employees knowledge about different choices and how these will affect the project. The tool should be able to give data on multiple aspects, i.e. all aspects Skanska's green color palette account for when categorizing the projects, such as sustainability, water usage, and so on. This tool will make it easier for projects purchasers to choose methods and materials that will ensure that the project becomes dark green.

The culture at the procurement unit at Skanska is focused on cost, and Hart and Milstein (2003) found that firms that invest in clean technology tend to have an organization culture that supports innovation and then will inform and communicate it to their customers. Carter et al. (2000), Genovese et al. (2013), and Porter and van der Linde (1995) argues that the environmental focus may improve the economic and competitiveness and not drive up costs.

6.1.2 Vertical mandate

According to Hayes and Schmenner (1978) an organization that has a decentralized purchasing department tends to be less good at managing purchases than a centralized purchasing department. Instead, decentralized purchasing departments tend to be more responsive to the market. The members of Sourcing Board are experienced purchasers, and have been educated in the traditional SCM, i.e. focusing on cost, quality, delivery, and flexibility (Kraljic, 1983). The first thing we questioned, was if the Sourcing Board is compounded in the right manner to change from a traditional supply chain to a sustainable (carbon neutral) supply chain.

Only one interviewee questioned if the Sourcing Board was composed with the right expertise to meet future demands. Carter and Rogers (2008) recognized that there is limited knowledge about how an organization should design their purchasing processes to become truly sustainable.

We suggest that the Sourcing Board and the sourcing process will have to change to meet future demands. According to Hart and Milstein (2003) the business model need to change when the vision does. As companies will have to prioritize differently and be able to adapt to new innovation, both the Sourcing Board and the sourcing processes need to use the specialist departments in safety, green, finance and so on further. This work has started but has not been fully integrated. By collaborating more with the different departments, the knowledge gap between purchasers and sustainable business managers will decrease. The sourcing processes should always include that the category team receive consultation and guidance from the safety, green and finance department before presenting for the Sourcing Board.

The result of the interviews and the observations of the Nordic sourcing process is that the Sourcing Board is systematically bypassing the process. As the Sourcing Board will handle more complex cases due to the carbon neutral strategy, this will put pressure on Skanska and other companies to secure that they have carbon low suppliers. The fear of disrupting flow of production due to higher demands is something that Simpson and Power (2005) highlights, and can be connected to the organization's purchasing competitive priorities have been; cost, quality, delivery and flexibility (Ward, McCreery, Ritzman and Sharma, 1998; Krause, Pagell and Curkovic 2001; Rosenzweig and Roth, 2004). Nevertheless, as Hart and Milstein's (2003) sustainable value framework states, organizations need to prepare themselves for the future, invest in new technologies and develop, and require new standards to comply with the future demands and market.

The Sourcing Board cannot bypass the processes and save time as this will lead to the wrong suppliers ending up in the supplier base. The interviewees noted that during the presentation the focus of the presentation was misaligned with the purpose of the tollgate, as the Sourcing Board had not had time to go through the material before the presentation or asked the category team for any uncertainties. These two factors contributed to that the presentations exceeded the set time. We suggest that the sourcing processes should conduct the sourcing processes as it is, and not skip any of the tollgates. As the importance of securing the right suppliers will increase due to complexity. In order to reach carbon neutrality by 2050, Tollgate 2 and Tollgate 5 plays a significant

role. The focus should be in the beginning of the sourcing process, Tollgate 1 and Tollgate 2, to secure that suppliers that do not align with Skanska's vision will not go further in the processes which both Walton et al. (1998) and Govindan et al. (2015) agrees with. Skanska should also start to use Tollgate 5 more frequently to follow up on suppliers if they have fulfilled the initial agreement. Pagell and Shevchenko (2014) and Guide, Harrison and Van Wassenhove (2003) suggest that the environmental impact should be based on a life cycle assessment, instead of measuring in every instance. We argue that the following up should be scheduled after the agreement signing, and if a supplier does not follow laws and regulations or Skanska's requirements, the supplier should not be used and there should be consequences. Monitoring and audits are essential for organizations to ensure that suppliers are operating accordingly to contract, regulate evaluations and so on (Svensson and Wagner, 2011).

To secure that other aspects than costs are taken into account during the tollgate presentations, companies should create a formalized template. This will ensure that all aspects that are important when selecting a supplier are taken into account, even if the individual responsible for the sustainable aspects in Sourcing Board are not present.

6.1.3 Horizontal mandate

The current processes have helped Skanska to become a leading player within the Swedish construction industry. However, today's way of working will not help Skanska to reach their goal of becoming carbon neutral by 2050. The lack of horizontal mandate is identified as one major missing link and needs to be developed to ensure carbon neutrality in the whole supply chain.

The cross-functional work will clarify corporate objectives and create a consensus in the environmental strategy (Lamming and Hampson, 1996; Bowen et al., 2001). The existing collaboration between the departments within the organization is identified as a step in the direction of becoming carbon neutral (Bowen et al., 2001). Bowen et al. (2001) and Lamming and Hampton (1996) believes that it is good to have regular contact between the departments to realize a sustainable strategy and the objectives becomes more clear as it ensures that the organization is working towards the same direction.

To become carbon neutral it is important to use suppliers that have high ambitions and aim to change the market but Skanska's extremely large supplier base makes it complex to have control and monitor which of their suppliers that complies with their requirements. Contrary to the thoughts of Pagell and Shevchenko (2014) Skanska is trying to take full responsibility for their entire supply chain rather than outsourcing the emissions to their suppliers.

Theoretically, the NPU has the mandate in terms of which suppliers that should be used by e.g. developing the segmentation model and framework agreements. However, the line organization has the practical mandate of the purchasing process as they can use any supplier without consequences. The uncoordinated purchasing is possible as the projects need to proceed but the lack of control makes it hard for Skanska to ensure that suppliers are operating accordingly to Skanska's requirements (Svensson and Wagner, 2001). In order to reach carbon neutrality we

suggest implementing actions if the projects use suppliers without framework agreements, suppliers that are not in the segment *Key* or *Preferred* or with an unaccepted self-assessment status.

To tackle this barrier, it is important that the procurement department have meetings with the line organization in an early stage and discuss improvements together. In that manner, the department can ensure that the line organization feel confident to use the agreements. An improved collaboration could therefore lead to a higher contract loyalty as NPU can develop agreements with the influence of the line organization. A closer cooperation between the departments could also overcome the feeling of “them against us” and can be done by educating and raise the competence of the purchasers in terms of climate aspects.

Moreover, the green color palette, see appendix B, indicates the environmental level of projects but does not correspond to the company’s current segmentation model. To make the color palette more integrated in the organization, we recommend that it should be considered in the segmentation model by considering the different colors in the palette. Today, near zero carbon footprint is however not mandatory to become deep green and we suggest that the segmentation model should include it. To make it easier for the category purchaser and the line organization to choose suppliers that will ensure carbon neutral projects. A supplier that corresponds to the color dark green could be defined as a *Key* supplier and should indicate that it could be used in dark green projects as well, see figure 12.



Figure 12. *Suggested colors in the segmentation model.*

Changing the structure of the different departments can take time, but the NPU can take actions today to take their own ownership of the goal. Teuteberg and Wittstruch (2010) found that it is important to have an efficient and flexible IT system that supports sustainable activities, otherwise it will be hard to have a sustainable supply chain strategy. We suggest that one action could be to suggest at least one supplier with lower carbon emissions in the purchasing systems. In that way, there is always a green option available for the projects.

6.1.4 Preparing the market

The purchasing department's goal is to meet the customer's requirements (Leenders and Fearon, 2006), therefore it is important to continuously communicate the change of a firm's internal responsibilities and strategies with the suppliers, customer, and media (Hart and Milstein, 2003).

Despite the need of vertical and horizontal mandate it is important to prepare the market since the Swedish construction industry is currently not used to consider carbon emissions within procurement. Many of the interviewee had a positive attitude on having a long-term relationship with suppliers. This is according to Bowen et al. (2001) and Vachon and Klassen (2006a) been a success factor when implementing a sustainable strategy.

As a leading player within the industry, it is therefore important to push the issue forward by developing and growing together with important stakeholders. However, to suddenly increase the requirements in terms of carbon emissions is something that discourages Skanska. Instead of changing demands abruptly, we suggest companies to inform their suppliers that their requirements will be raised within the next years.

A big barrier for all companies in the industry is that public procurement does not accept offers with higher standards than required. However, organizations can choose to actively influence private customers. A first step is to require data regarding the supplier's carbon emissions, and thereafter take this into account when developing agreements where EPD's are a good way of controlling the CO₂ load. In the near future, companies can put higher demands on their suppliers by filtering the ones that have this kind of declaration. Since one category within Skanska frequently uses EPD's, the knowledge can also be disseminated through the procurement department. By using these declarations, the procurement department can control their emissions to a higher extent since data is collected. The development of the declaration is costly, however, it represents a great tool to analyze sourcing cases. By requesting and prioritizing suppliers with EPD's, organizations take an active step towards becoming carbon neutral. If a buyer chooses to use a supplier with high CO₂ emissions while there are other options, the procurement department may pay for the emissions through a collective fine of internal funds. Measuring the environmental impact is important, as it gives indications of where the firm is and what measurements will be needed to be taken to meet the strategy (Pagell and Shevchenko, 2014).

Today, some private clients have sharp demands in terms of carbon emissions but it is important to set higher standards for all customers. By adding requirements in the pre-qualification (e.g. EPD's) companies can investigate what the market's current states are and challenge them based on the outcome. However, in order to accelerate the journey towards carbon neutrality, clear mandate would be needed to weight reduced carbon emissions over offer costs.

6.2 Robustness of the study

The first step in our research process was to understand the general procurement process and Skanska's vision. To understand the general procurement process, we reviewed the literature on both traditional and sustainable procurement. The literature was limited and lacked information about how and where in procurement processes mandate should be included to achieve a transition. To increase the reliability of the report, most of the literature was peer-reviewed articles but the lack of literature decreased the reliability of the report. To get further information about the construction industry we read Sweden's four biggest construction companies' (based on annual revenue) annual reports to generally understand the industry's definition of sustainability. As it would have been unethical to contact the competitors we decided to start investigation of how to become carbon neutral internally at Skanska.

Due to time limitation, we were not able to conduct semi-structured interviews with all purchasers at Skanska to get the whole picture. Therefore, we decided to focus on the strategic process, i.e. sourcing process, and interviewed purchasers that conducted the process. The scope was further delimited by focusing on the categories with the most carbon emission. The time limit also affected the amount of sourcing cases we attended to since the sourcing meetings are relatively seldom. Holidays, canceled meetings, and other obstacles resulted in only two observed sourcing cases. However we got access to all previous cases from 2015 and 2016 in order to investigate the tollgate presentations.

The qualitative interviews gave us valuable insight into the procurement process at a well-established construction company. The result on horizontal mandate, i.e. cross-functional, is weak as we only interviewed four employees outside the purchasing department and therefore lacks generalization. A trade-off of the study was that we didn't get a broad perspective on how the lack of mandate affects an organization, which a quantitative study could have given us. Therefore, we acknowledge that the findings from the interviews cannot be generalized and limits the reliability of the result. Instead, the findings can be a starting point for further investigation of organizations that are facing the same transition due to higher sustainability requirements on their suppliers and realize the importance of mandate in the procurement department.

7. Conclusions and future studies

This section presents the conclusions of the study by presenting the answers to the research questions, the study's contribution and future studies.

7.1 Reviewing the purpose of the study

The purpose of the thesis was to investigate how mandate within an organization affects carbon neutral purchasing when transitioning from traditional to sustainable supply chain. The study has been driven by answering the research questions. To be able to fulfill the purpose of the study, a case study based on 21 semi-structured interviews with employees at Skanska was conducted to address the main research question:

How does the lack of mandate affect carbon neutral purchasing?

To answer the main question, two sub-questions were defined and answered.

7.1.1 Answering sub-research question 1

The first sub-research question was formulated as:

How does vertical mandate within the procurement department affect carbon neutral purchasing?

Based on the interviews, lack of vertical mandate within the procurement department is identified to cause confusion among the employees. The employees do not know if they have the authority to include suppliers with low carbon emissions but a higher cost per product in their category strategy.

The uncertainty among the Sourcing Board members is also evident as they do not know their mandate to develop agreements with suppliers with lower carbon emission with higher cost. This has made the situation for the Sourcing Board clamped and therefore no carbon emission questions are being asked.

7.1.2 Answering sub-research question 2

The second sub-research question formulated as:

How does horizontal mandate between departments affect the carbon neutral purchasing?

The findings showed that there is no clear defined horizontal mandate within the organization, contributing to low contract loyalty and little success in terms of reducing carbon emissions. Furthermore, when the different departments are not aware of their mandate, they blame each other rather than cooperating. The lack of mandate is identified as a barrier in terms of procuring carbon neutral and the mandate should be delegated by the management to ensure that all departments are aware of what actions and choices they should take.

7.1.3 Answering the main research question

The main research question was:

How does the lack of mandate affect carbon neutral purchasing?

Skanska has developed their sourcing and purchasing processes according to the literature, however, the processes do not take carbon emissions into account. Based on the analysis of the two sub-research questions and the literature, both vertical and horizontal mandate are identified as two missing links to procure carbon neutral. We have concluded that carbon neutrality is complex, and when there is missing links it becomes difficult to reach the target, even though the processes are exactly operating as described in the literature. Skanska has many projects and initiatives that are being implemented but these will not make the company carbon neutral. Mandate must be provided just as a project needs time and money to succeed. Clear mandate within the procurement department is essential in order to take carbon neutrality into account when developing framework agreements with suppliers. Furthermore, the mandate between departments must be clear to ensure that each department is aware of their responsibility and what actions they must realize. The communication between the departments is also identified as an important factor as all employees must understand why certain decisions are made.

7.2 Contribution and future research

There is a lot of literature on how organizations theoretically should purchase environmental friendly, especially in the manufacturing industry, however, there is a gap in how organizations should do it in practice. This study has found that mandate within the procurement department is of importance when purchasing carbon neutral and this research contributes with knowledge within this unexplored area. An organization can have well-developed purchasing processes and follow them, but lack of mandate is identified as a missing link when becoming carbon neutral. Further, this study contributes with research on how to consider carbon emissions within purchasing.

This report was delimited to the purchasing department, and further research needs to investigate if the importance of mandate between different departments plays a role when transitioning from traditional to a sustainable supply chain. Since the study mainly focused on the interplay within Skanska, further research needs to be conducted on how the market will change. A study within public procurement for where construction companies are able to give side offerings could also be conducted.

Another interesting angle of research would be to investigate the suppliers' side of the transition to carbon neutral production. This would provide valuable insight on how the suppliers want to collaborate with organizations that have high requirements and how the exchange between them can look like.

Future research needs to investigate if implementing mandate in the purchasing department will lead to full employment of a carbon neutral purchasing or if there are other key aspects that need

to be considered. As our study only demonstrated that without clear mandate, companies will not achieve their vision of becoming carbon neutral.

References

- Kromoser, R., Mariscotti, F., Schuh, C. and Strohmer, M. (2012). The purchasing chessboard. [online] Available at: <http://www.middle-east.atkearney.com/documents/787838/788065/Purchasing+Chessboard+-+English.pdf/e4a9dc5e-5229-47b5-b02c-47de726dcf2b> [Accessed 28 April, 2017].
- Ballou, R. H. (2007). The evolution and future of logistics and supply chain management. *European Business Review*, Vol 19 (4), pp. 332 - 348.
- Bell, E. and Bryman, A. (2007). The ethics of management research: An exploratory content analysis. *British journal of Management*, Vol 18 (1), pp. 63-77.
- Bensaou, M. (1991). Portfolios of buyer-supplier relationships. *Sloan Management review*, Vol 40 (4), pp-35-44.
- Blomkvist, P. and Hallin, A. (2015). *Metod för teknologer: examensarbete enligt 4-fasmodellen*. (1:2. uppl.) Lund: Studentlitteratur, pp. 76-81.
- Boverket, (2016). *Boverket arbetar för att fler ska erbjudas bostad*. [online] Available at: <http://www.boverket.se/sv/om-boverket/publicerat-av-boverket/kampanjer/boverket-arbetar-for-att-fler-ska-erbjudas-bostad/> [Accessed 08 May, 2017].
- Bowen, F. E., Cousins, P. D., Lamming, R. C. and Faruk, A. C. (2001). The role of supply management capabilities in green supply. *Production and Operations Management*, Vol 10 (2), pp. 174-189.
- Burbridge, D (2012). *Building a lower-carbon construction industry*. [online] Carbon trust. Available at: <https://www.carbontrust.com/news/2012/02/building-a-lower-carbon-construction-industry-1/> [Accessed 23 Jan. 2017].
- Byggindustrin, (2016). *Tre utmaningar i branschens klimatarbete*. [online] Available at: <http://byggindustrin.se/artikel/nyhet/tre-utmaningar-i-branschens-klimatarbete-23665> [Accessed 06 May, 2017].
- Cammish, R. and Keough, M. (1991). A strategic role for purchasing. *The McKinsey Quarterly* 3, pp. 22–39.
- Carter, C. R. (2005). Purchasing social responsibility and firm performance: the key mediating roles of organizational learning and supplier performance. *International Journal of Physical Distribution & Logistics Management*, Vol 35 (3), pp. 177-194.
- Carter, C. R., Kale, R. and Grimm, C. M., (2000). Environmental purchasing and firm performance: an empirical investigation. *Transportation Research Part E: Logistics and Transportation Review*, Vol 36 (3), pp. 219–228.
- Carter, C. R. and Rogers, D. S. (2008). A Framework of Sustainable Supply Chain Management: Moving Toward New Theory. *International Journal of Physical Distribution and Logistics Management*, Vol

38 (5), pp. 360-387.

CDP, (2017). *About us*. [online] Available at: <https://www.cdp.net/en/info/about-us> [Accessed 18 Feb, 2017].

CDP Worldwide. (2016). *Out of the starting blocks- Tracking progress on corporate climate action*. England: We mean business. [online] Available at: [https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/001/228/original/CDP Climate Change Report 2016.pdf?1477993118](https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/001/228/original/CDP%20Climate%20Change%20Report%202016.pdf?1477993118) [Accessed 18 Jun, 2017].

Collis, J. and Hussey, R. (2014). *Business Research- A practical guide for undergraduate and postgraduate students*. 4th edition. New York: Palgrave Macmillan Higher Education.

Cooper, M. C., and Ellram, M. L. (1993). Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy. *International Journal of Logistics Management*, Vol 4 (2), pp. 13-24.

Dubois, A. and Pedersen, A. C. (2002). Why relationship do not fit into purchasing portfolio models. A comparison between portfolio and industrial network approaches. *European journal of purchasing & supply management*, Vol 8 (2), March 2002, pp 35-42.

Eisenhardt, K. M. and Graebner M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, Vol 50 (1), pp 25-32.

Elkington, J. (1998). *Cannibals with Forks*. The Triple Bottom Line of 21st Century Business. New Society Publishers, Gabriola Island, BC, Canada.

Ellram, L. M. and Cooper, M. (1990). Supply Chain Management, Partnership, and the Shipper - Third Party Relationship. *The International Journal of Logistics Management*, Vol 1 (2), pp. 1 – 10.

Erlandsson, M. (2006). *Ställ verifierbara miljökrav – eller på “heder och samvete”*. [online] Stockholm, Sweden: IVL Swedish Environmental Research Institute Ltd. Available at: <http://www.ivl.se/download/18.343dc99d14e8bb0f58b74d9/1445515627190/B1685.pdf> [Accessed 17 May, 2017].

Gluch, P. (2005). *Building green. Perspectives on environmental management in construction*. PhD thesis. Gothenburg, Sweden: Department of Civil and Environmental Engineering, Chalmers University of Technology.

Faith-Ell, C. (2005). *The application of environmental requirements in procurement of road maintenance in Sweden*. PhD thesis. Stockholm, Sweden: Land and Water Resources Engineering, Royal Institute of Technology.

Faith-Ell, C., Balfors, B. and Folkesson, L. (2006). The application of environmental requirements in Swedish road maintenance contracts. *Journal of Cleaner Production*, Vol 14 (2), pp. 163-171.

Florida, R. (1996). Lean and green: the move to environmentally conscious manufacturing. *California Management Review*, Vol 39 (1), pp. 80-105.

- Gelderman, C. J. and van Weele, A. J. (2005). Purchasing Portfolio models: A Critique and Update. *The journal of supply chain management*, Vol 41 (3), pp. 19-29.
- Genovese, A., Koh, L. S. C., Bruno, G. and Esposito, E. (2013). Greener supplier selection: state of the art and some empirical evidence. *Internal Journal of Production Research*. Vol 51 (19), pp. 2868-2886.
- Gibbert, M., Winfried, R. and Wicki, B. (2008). What Passes as a Rigorous Case Study?. *Strategic Management Journal*, Vol 29 (13), pp. 1465-1474.
- Gluch, P., Brunklaus, B., Johansson, K., Lundberg, Ö., Stenberg, A-C. and Thuvander, L. (2007). *Miljöbarometern för bygg- och fastighetssektorn 2006*. Göteborg, Sweden: Chalmers University of Technology. Available at: http://www.cmb-chalmers.se/wp-content/uploads/2015/10/miljobarometern_2006.pdf [Accessed 17 may, 2017].
- Govindan, K., Rajendan, S., Sarkis, J. and Murugesan, P. (2015). Multi-criteria decision making approaches for green supplier evaluation and selection: a literature review. *Journal of Cleaner Production*, Vol 98, pp. 66–83.
- Guide, D .R . JT., Harrison, T. P., and Van Wassenhove, L. N., (2003). The Challenge of Closed-Loop Supply Chains. *Interfaces*, Vol 33 (1), pp.3-6.
- Hart, S. and Milstein M. B. (2003). Creating sustainable value. *The Academy of Management Executive*, Vol 17 (2), pp. 56-99.
- Hayes, R. and Schmenner, R. (1978). How should you organize manufacturing?. *Harvard Business Review*, Vol 56 (1) pp. 105–118.
- Heege, F. (1981). Portfolio management in der Beschaffung. *Der Betriebswirtschaft*, *Sonderbrunck*, pp. 17-23 (German text).
- Ho, W., Xu, X. and Dey, P. K. (2010). Multi-criteria decision making approaches for supplier evaluation and selection: a literature review. *European Journal of Operations Research*, Vol 20 (1), pp. 16-24.
- Igarashi, M., de Boer, L. and Magerholm Fet, A. (2013). What is required for greener supplier selection? A literature review and conceptual model development. *Journal of Purchasing & Supply Management*, Vol 19, pp. 247–263.
- International Organization for Standardization, (nd). *Popular Standards*. [online] Available at: <https://www.iso.org/popular-standards.html> [Accessed 08 May, 2017].
- JM, (2016). *Hållbart samhällsbyggande*. [online] Available at: <https://www.jm.se/om-jm/hallbarhet/> [Accessed 23 Jan, 2017].
- JM, (2017). *Samarbeten*. [online] Available at: <https://www.jm.se/om-jm/hallbarhet/hur-vi-arbetar/sa-samverkar-vi-med-var-omvarld/samarbeten/> [Accessed 06 May, 2017].

- Kraljic, P. (1983). Purchasing Must Become Supply Management. *Harvard Business Review*, Vol 6 (5), pp. 109-117.
- Krause, D.R., Pagell, M. and Curkovic, S. (2001). Toward a Measure of Competitive Priorities for Purchasing. *Journal of Operations Management*, Vol 19 (4), pp. 497-512.
- Krause, D., Vachon, S. and Klassen, R.D. (2009). Special topic forum on sustainable supply chain management: introduction and reflections on the role of purchasing management. *Journal of Supply Chain Management*. Vol 45 (2), pp. 18- 25.
- Lamming, R. and Hampson, J. (1996). The environment as a supply chain management issue. *British Journal of Management*, Vol 7, pp. 45-62.
- Leenders, M. R, Nollet, J. and Ellram. L. M. (1994). Purchasing to Supply Chain Management. *International Journal of Physical Distribution & Logistics Management*, Vol 24 (1), pp. 40-42.
- Leenders, M. R. and Fearon, H. (2006). *Purchasing and Supply Management*, 13th ed., Richard D. Irwin.
- Luzzini, D., Brandon-Jones, E., Brandon-Jones, A. and Spina, G. (2013). From sustainability commitment to performance: The role of intra- and inter-firm collaborative capabilities in the upstream supply chain, *International Journal of Economics*, Vol 165, pp. 51-63.
- Mokhlesian, S. (2014). How Do Contractors Select Suppliers for Greener Construction Projects? The Case of Three Swedish Companies. *Sustainability*, Vol 6, pp. 4133-4151.
- NCC, (2015). *NCC vill sänka sina CO2 utsläpp med 50 procent*. [online] Available at: <https://www.ncc.se/media/pressrelease/397662090d8c1025/> [Accessed 08 May, 2017].
- NCC, (2016). *Hållbarhetsramverk*. [online] Available at: <https://www.ncc.se/hallbarhet/hallbarhetsramverk/> [Accessed 23 Jan, 2017].
- NCC, (2016). *NCC:s nya kalkylator hjälper kunderna att ta klimatsmarta beslut*. [online] Available at: <https://www.ncc.se/media/pressrelease/87ffca3555325211/> [Accessed 08 May, 2017].
- Pagell, M. and Shevchenko, A. (2014). Why research in sustainable supply chain management should have no future- Development of Truly sustainable supply chain. *Journal of supply chain management*, Vol 50 (1), pp. 44-55.
- Pagell, M., Wu, Z. and Wasserman, M. E. (2010). Thinking differently about purchasing portfolios: an assessment of sustainable sourcing. *Journal of Supply Chain Management*, Vol 46 (1), pp. 57- 73.
- Patel, R. and Davidson, B. (1994) *Forskningsmetodikens grunder*. 2nd ed. Lund: Studentlitteratur.
- Peab, (n.d.). *Hållbart samhällsbyggande*. [online] Available at: <http://www.peab.se/hallbarhet/> [Accessed 24 Jan, 2017].
- Peab, (2016). *Års- och hållbarhetsredovisning 2016*. [online] Available at: <http://www.peab.se/Global/PEAB-SE/Documents/Rapporter/AR-HAR-2016.pdf> [Accessed

05 May, 2017].

Peteraf, M. A. (1993). The Cornerstone of competitive advantages: A resource-based view. *Strategic management journal*, Vol 14 (3), pp. 179-191.

Porter, M. E and van der Linde, C. (1995). Green and Competitive: Ending the Stalemate. *Harvard Business Review*, Vol 73 (5), pp. 120-134.

Research Institutes of Sweden, (nd). *Miljöklassning av byggnader*. [online] Available at: <https://www.sp.se/sv/centres/zeb/miljoklassning/Sidor/default.aspx> [Accessed 08 May, 2017].

Reuter, C., Foerstl, C., Hartmann, E. and Blome, C. (2010). Sustainable global supplier management: The role of dynamic capabilities in achieving competitive advantages. *Journal of Supply Chain Management*, Vol 46 (2), pp. 45- 63.

Rosenzweig, E. D. and Roth, A. V. (2004). 'Towards a Theory of Competitive Progression: Evidence from High-Tech Manufacturing'. *Production and Operations Management*, Vol 13 (4), pp. 354-368.

Sharma, S. and Henriques, I. (2005). Stakeholder Influences on Sustainability Practices in the Canadian Forest Products Industry. *Strategic Management Journal*, Vol 26 (2), pp. 159-180.

Simpson, D. F. and Power, D. J. (2005). Use the supply relationship to develop lean and green suppliers. *Supply Chain Management: An International Journal*, Vol 10 (1), pp. 60-68.

Skanska, (2015). *Skanska satsar på att bli klimatneutralt år 2050*. [online] Available at: <http://www.skanska.se/sv/om-skanska/pressmeddelande/nyhet/?nid=MICiBKQI> [Accessed 23 Jan, 2017].

Skanska, (2016). *Skanska ska vara klimatneutralt 2050*. [online] Available at: <http://www.skanska.se/sv/om-skanska/pressmeddelande/aktuellt/skanska-ska-vara-klimatneutralt-2050/> [Accessed 30 Jan, 2017].

Skanska, (2017). *Våra krav på dig som leverantör*. [online] Available at: <http://www.skanska.se/om-skanska/for-leverantorer/vara-krav-pa-dig-som-leverantor/> [Accessed 16 May, 2017].

Skinner, W. (1969). Manufacturing- Missing Link in Corporate Strategy. *Harvard business review*, Vol 46 (3), pp. 136-145.

Sterner, E. (2002). Green procurement' of buildings: a study of Swedish clients' considerations. *Construction Management and Economics*, Vol 20 (1), pp- 21-30.

Svensson, G. and Wagner, B. (2011). Transformative business sustainability: Multi-layer model and network of e-footprint sources. *European Business Review*, Vol 23 (4), pp. 334 – 352.

Sveriges riksdag, (2014). *Dokument och lagar*. [online] Available at: http://www.riksdagen.se/sv/dokument-lagar/dokument/kommittedirektiv/klimatfardplan-2050---strategi-for-hur-visionen_H2B153 [Accessed 19 Jan, 2017].

Swedish Environmental Management Council (EKU-delegationen), (2001). *Slutrapport – Ett levande verktyg för ekologiskt hållbar offentlig upphandling*. Stockholm, Sweden.

Swedish Environmental Protection Agency, (2016). *Sverige utan nettoutsläpp av växthusgaser 2050*. [online] Available at: <http://www.naturvardsverket.se/fardplan2050> [Accessed 05 June, 2017].

Sweden Green Building Council, (2016). *Miljöbyggnad*. [online] Available at: <https://www.sgbc.se/var-verksamhet/miljobyggnad> [Accessed 08 May, 2017].

Swedish Standards Institute, (2016). *Snart kommer standarden för hållbara inköp*. [online] Available at: <http://www.sis.se/Nyheter-och-press/Nyheter/Snart-kommer-standarden-for-hallbara-inkop/> [Accessed 06 May, 2017].

Tate, W., Ellram, L. and Dooley, K. (2012). Environmental purchasing and supplier management (EPSM): theory and practice. *Journal of Purchasing and Supply Management*, Vol 18 (3), pp. 173–188.

Teuteberg, F. and Wittstruck, D. (2010). A Systematic Review of Sustainable Supply Chain Management Research. [online] MKWI 2010 – Betriebliches Umwelt- und Nachhaltigkeitsmanagement, pp.1001-1015. Available at: http://webdoc.sub.gwdg.de/univerlag/2010/mkwi/03_anwendungen/betriebliches_umwelt-_und_nachhaltigkeitsmanagement/01_a_systematic_review_of_sscm.counted.pdf [Accessed 17 May, 2017]

The Nordic Swan Ecolabel, (2012). *Svanenmärkta bus - en ansökarvägledning*. [online] Available at: http://www.svanen.se/Documents/Broschyror/Ansokningsguide_hus.pdf [Accessed 08 May, 2017].

The Swedish Construction Federation, (2015). *Byggandets klimatpåverkan*. [online] Available at: http://www.byggmaterialindustrierna.se/wp-content/uploads/2015/02/Klimatp%C3%A5verkan-fr%C3%A5n-byggandet_SLUTRAPPORT_20150130.pdf [Accessed 12 Feb, 2017].

The Swedish Construction Federation, (2016a). *Sveriges Byggindustriers yttrande över delbetänkande från Miljömålsberedningen med förslag om ett klimatpolitiskt ramverk inklusive långsiktigt mål*. [online] Available at: <http://www.regeringen.se/49da09/contentassets/a73d609a28274b86961a199eb16c16bc> [Accessed 9 May, 2017].

The Swedish Construction Federation, (2016b). *Byggandets klimatpåverkan*. [online] Available at: https://publikationer.sverigesbyggindustrier.se/Userfiles/Info/1129/Strandparken_BI_rapport_slutversion_160613.pdf [Accessed 05 May, 2017].

Utterback, J. M. (1974). Innovation in Industry and the Diffusion of Technology. *American Association for the Advancement of Science*, Vol 183, pp. 620-626.

Vachon, S. and Klassen, R.D. (2006). Extending green practices across the supply chain: The impact of upstream and downstream integration. *International Journal of Operations and Production*

Management, Vol 26 (7), pp. 795-821.

Varnäs, A., Balfors, B. and Faith-Ell, C. (2007). Environmental consideration in procurement of construction contracts: current practice, problems and opportunities in green procurement in the Swedish construction industry. *Journal of Cleaner Production*, Vol 17 (13), pp. 1214-1222.

Walton, S. V., Handfield, R. B. and Melnyk, S. A. (1998). The green supply chain: integrating suppliers into environmental management processes. *International Journal of Purchasing and Materials Management*, Vol 34 (1), pp. 2-11.

Ward, P. T., McCreery, J. K., Ritzman, L. P. and Sharma, D. (1998). Competitive priorities in operations management. *Decision Science*, Vol 29 (4), pp. 1035- 1046.

Winter, S. and Lasch, R. (2015). Environmental and social criteria in supplier evaluation - Lessons from the fashion and apparel industry. *Journal of Cleaner Production*. Vol 139, pp. 175-190.

World Commission on Environment and Development, (1987). *Our Common Future*. Oxford University Press, New York, NY. Available at: <http://www.un-documents.net/our-common-future.pdf> [Accessed 05 May, 2017].

World economic forum, (2017). *Shaping the Future of Construction Inspiring innovators redefine the industry*. [online] Available at: [http://www3.weforum.org/docs/WEF Shaping the Future of Construction Inspiring Innovators redefine the industry 2017.pdf](http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_Inspiring_Innovators_redefine_the_industry_2017.pdf) [Accessed 16 May, 2017].

Zailani, S., Jeyaraman, K., Vengadasan, G. and Premkumar, R. (2012). Sustainable supply chain management (SSCM) in Malaysia: A survey. *Journal of Production Economics*, Vol 140 (1), pp. 330-340.

Yin, R. (2009). *Case study research design and methods*. 4th ed. Applied Social Research Methods Series, Vol 5, SAGE Publications Inc.

Appendix A - Interview questions

Allmänt för alla intervjupersoner

Vad heter du?

Kan du berätta lite kort om din roll och hur ditt dagliga arbete ser ut? Och din bakgrund?

Är det okej om vi spelar in intervjun?

Vill du vara anonym eller är det okej om vi skriver ut ditt namn i rapporten?

Är det okej om vi kontaktar dig efter intervjun vid eventuella frågor?

(Avslut: Är det någonting mer du skulle vilja berätta som du tror att vi skulle kunna vara av värde för oss?)

Sourcing Board

Hur har Skanska Sveriges mål om att bli klimatneutrala förmedlats till Sourcing Board?

Kan du övergripande förklara de viktigaste stegen i sourcing processen som kategoriansvariga (KA) går igenom?

Vilka faktorer tar ni hänsyn till när KA tar upp case till Sourcing Board och vilken är den viktigaste?

Hur lång tid har man på sig att presentera respektive TG?

Kan du kortfattat beskriva vad som sker i TG 2?

Hur kommer det sig att man kan hoppa över TG2, vad gör KA istället?

Finns det en tydlig struktur på hur Sourcing Board ska utvärdera en TG1, TG2 osv för att förstå om en KA ska gå vidare i processen?

Hur säkerställer Sourcing Board i ett tidigt skede att leverantörer med högt koldioxidutsläpp jämfört med andra leverantörer inte går vidare i processen?

Hur anser du att man skulle kunna väva in grönt/klimat i högre utsträckning inom inköp?

Vilket ansvarsområde har du under Sourcing Board och hur påverkar det din roll under mötena?

Om någon är borta som är extra ansvarig för era områden, vem tar på sig det ansvaret?

Hur hanterar ni en faktor som har blivit röd på heat mapen?

Hur hanteras fokusgrupper inom miljö?-

Om en riskkategori inom klimat går upp i Sourcing Board, hur viktas klimat mot ekonomi? Sker det på plats eller krävs ett djupare arbete?

Miljö

Hur ser Sourcing Boards strategi ut för att nå målet om klimatneutralitet?

Vem är ansvarig för att implementera klimatneutralitet i Skanska Sverige?

Hur stöttar Sourcing Board processen Skanska Sveriges mål om att bli klimatneutrala?

Vilken process är ytterst ansvarig för att Skanska når sitt mål?

Vilka möjligheter ser du med att förändra synsättet av granskning av leverantörer från ekonomi till klimat? Vilka hinder?

Mandat

Vad för mandat har Sourcing Board att ta ett alternativ som är grönare men dyrare?

Dokumentation

Hur dokumenteras det som bestäms under Sourcing Board?

Finns det möjlighet att ta del av det?

Kategoriansvarig

Hur länge har du arbetat med inköp?

Vad för typ av utbildning har kategoriansvariga inom inköp fått (bakgrund och skola)?

Sourcing Board

Vilka faktorer brukar du ta hänsyn till när du tar upp en leverantör till Sourcing Board?

Vilken typ av frågor ställs under tollgate-presentationerna i Sourcing Board?

Vilka externa faktorer påverkar ditt val av leverantör?

Vilka faktorer tar Sourcing Board hänsyn till när ni presenterar leverantörer?

Vilken/vilka faktorer är den/de viktigaste?

Hur ser er kategoris strategi ut? Och vem bestämmer den?

Vad för hinder och möjligheter ser du med att ställa högre krav på leverantörerna gällande miljö, från skanskas perspektiv och kundens?

Kravställning

Hur bestäms vilka leverantörer som används i ett projekt?

Vilken typ av avtal använder du med leverantörer och varför?

Hur ställer du krav på leverantörerna?

Hur och på vilka aspekter utvärderar du leverantörerna?

Hur säkerställer ni idag att leverantör uppfyller dem målen som de säger att de ska klara?

Hur väljer ni ut vilka leverantörer som ska granskas på vilka krav granskas dem?

Hur ofta följer ni upp leverantörerna och hur görs detta?

Vad har personen/personerna som utvärderar för typ av bakgrund (utbildning, arbete m.m.)?

Klimatfrågor

Hur arbetar du med klimatfrågor i inköpsprocessen?

Hur använder du dig av EPDér?

Hur kan klimatfrågor översättas till tydliga målvärden? (Hur kan dessa mätas?)

Hur förmedlar ni internt att klimatfrågan är i fokus?

Vilka möjligheter och hinder ser du med att förändra synsättet av granskning av leverantörer från ekonomi till klimat?

Vad betyder klimatneutral för dig/inköpsavdelningen?

Hur har målet om klimatneutralitet kommunicerats till din kategori? Från vem och hur?

Hur driver du utvecklingen mot klimatneutrala köp?

Hur ser relationerna ut mellan skanska och leverantörerna?

Kunskap

Vilka avdelningar jobbar du nära med när ni bestämmer leverantörer?

Hur delar du information gällande klimatsmarta inköp?

Hur sprider ni kunskap internt om en leverantör?

Appendix B - Skanska's Green color palette

The “green color palette” is one example of a concept based on the goal of reaching carbon neutrality and is used to define how green Skanska’s projects are, see figure 13 (Interviewee D). The projects can become different colors based on their usage of energy, carbon emission, material, and water. Vanilla is defined compliance of laws and regulations while green indicates higher environmental standards. Deep green is the highest environmental standard, meaning that the project has almost zero impact in every aspect. For a project to be classified as deep green the project needs to fulfill three of the aspects, including the energy aspects. Near zero carbon footprint is however not mandatory to become deep green.

Aspects	Vanilla	Green 1	Green 2	Green 3	Deep green
Energy					Net zero primary energy
Environment					Near zero carbon footprint
Material					Zero non durable material Zero hazardous materials Zero construction waste
Water					Net zero water

Figure 13. Skanska's color palette (Skanska).

Appendix C - Recommendations

We conclude that Skanska can implement many of the criteria in the framework without increasing costs. To summarize, we recommend Skanska to take the following actions to achieve carbon neutral purchasing:

Vertical mandate

- Stop bypassing the processes to have a good foundation to start from. All tollgates must be followed and implement consequences if purchasers chooses suppliers that are not allowed.
- Implement a slide in the presentation of Tollgate 1 which presents the carbon emissions from each supplier.
- Develop a roadmap with trade-offs and priorities to support your strategy. Update the way of selecting and evaluating suppliers in the sourcing process by taking sensitive data and changing weights into account such as environmental performance, e.g. EDP's. This will be the foundation of clear purchasing guidelines.
- Conduct regular audits on suppliers to monitor and to ensuring that Skanska's suppliers are following their agreements, as it is crucial that Skanska is working with suppliers that have the same vision and strategy as them. There should be consequences for those suppliers that are not following the agreements.
- Change the company's business model design by restructuring the Sourcing Board since the composition of members not corresponds to the new strategy or always include the sustainable business development department in the sourcing process. The company consists of plenty employees with knowledge regarding more sustainable solutions.
- Include carbon emissions in the segmentation model. The segmentation model should correlate with the green color palette to simplify for the purchaser when choosing suppliers.

Horizontal mandate

- It is necessary to communicate the roadmap, both on the intranet and in the daily work setting, to change the norms and culture from cost to carbon neutral.
- Educate and develop skills and capabilities to procure carbon neutral to prepare for the future, and give clear mandate to the employees.
- Continue to search for innovations and start-ups to follow the market and be aware of alternative materials and products. Skanska needs to see the opportunities with start-ups and give mandate to the employees to negotiate with them.
- Give mandate to prepare the suppliers that Skanska's requirements regarding carbon emissions will increase during the next years.
- Improve the communication between the NPU and the line organization in order to increase the contract loyalty and be aware of their different mandates.

