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Climate neutral public procurement in the construction industry: Possibilities, obstacles and current actions

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Janna Dervisic

Abstract

The climate impact from the construction industry is a topic that has received increased attention over the past years. Currently, the construction industry accounts for no less than one fifth of Sweden's total climate impact, with regards to both the construction and operating phase. In 2016 the Swedish construction sector emitted approximately 12,8 million tonnes of carbon dioxide equivalents, which corresponds to 21 percent of Sweden's total greenhouse gas emissions. One key factor for achieving climate neutrality is client demand for climate-smart solutions. The purpose of this Master's thesis is to create an understanding of how public actors manage climate issues with regards to local policies in the local market by focusing on public procurement situations in the construction industry. Since the focus of the study is understanding people's actions and how they account for them by applying a holistic view of the study a qualitative research approach was applied. This study forms a case study that applies an abductive systematic combining approach. The data was mainly collected through semi-structured interviews with both external actors within the public sector and internal actors at the case company. A total of eight external interviews and three internal interviews were conducted. The collected empirical data was analyzed using thematic analysis. From the thematic analysis a total of two themes related to possibilities was found: *high level of ambition* and *environmental requirements in procurement*. In addition to this, a total of five themes related to obstacles was found: *economic aspects*, *legal aspects*, *lack of knowledge*, *lack of resources* and *technical aspects*. Besides possibilities and obstacles, a total of two themes related to current actions to increase climate aspects in public procurement was found: *partnering* and *developing long-term relationships with customers*. Suggestions for future research is that a similar investigation should be conducted by focusing on the private sector in order to contribute to the research area and increase generalization.

Keywords: *Public Procurement*, *Construction Industry*, *Partnering*, *Climate Neutrality*

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1. Introduction

The introduction chapter aims to highlight why the problem underlying this Master's thesis is interesting to study by describing the problem in both a global context and the focus for this study. The study's purpose, aim and research questions followed by the delimitations for this Master's thesis are also described in the introduction chapter. The last section of the introduction chapter presents the structure of the report.

1.1. Background

The climate impact from the construction industry is a topic that has received increased attention over the past years. Currently, the construction industry accounts for no less than one fifth of Sweden's total climate impact, with regards to both the construction and operating phase (Skanska 2018a). As furtherly, stated by Boverket (2019), in 2016 the Swedish construction sector emitted approximately 12,8 million tonnes of carbon dioxide equivalents, which corresponds to 21 percent of Sweden's total greenhouse gas emissions. That the construction industry has a great environmental impact cannot be denied, and is furtherly strengthen by Thuvander (2004), who stated that the construction industry accounts for no less than 40 percent of Sweden's total use of materials and energy (Thuvander 2004).

Fossil Fritt Sverige (2018) has taken a step in the direction of reducing climate impact from the construction industry by developing a roadmap for achieving climate neutrality in the construction industry by 2045. The concept climate neutrality is defined as net zero emissions of greenhouse gases to the atmosphere (Fossil Fritt Sverige 2018). Carbon dioxide, water vapor and methane are well-known greenhouse gases, among these, carbon dioxide is the most durable one in the atmosphere (Wong 2015). According to The Sustainable Development Goals Report "the world continues to experience rising sea levels, extreme weather conditions […] and increasing concentrations of greenhouse gases" (United Nations 2018, p. 10). One of humanity's major challenges is to combat climate change, and according to Rehm & Ade (2013, p. 199) "Buildings are substantial CO_2 emitters and contribute to climate change." In the article *Understanding and tackling societal grand challenges through management research* climate change is referred to as a Grand Challenge, meaning that, if climate change were to be completely counteracted, it would result in positive global effects (George et al. 2016). The United Nations has in their foundation defined the Grand Challenges as Sustainable Development Goals,

consisting of 17 goals that aims to be achieved by year 2030, among these, goal 13 aims to combat climate change and its consequences (George et al. 2016).

One key factor for achieving climate neutrality is client demand for climate-smart solutions both for the construction and operating phase (Skanska 2018b). Unfortunately, several studies indicate that there is a lack of demand for environmental and climate considerations in procurement (Ruparathna & Hewage 2015; Sourani & Sohail 2011; Mokhlesian 2014). Various researchers within the field explains that the absence of environmental and climate considerations in public procurement is due to the lack of knowledge and resources that prevail within the public sector (Ruparathna & Hewage 2015; Sourani & Sohail 2011). The roadmap developed by Fossil Fritt Sverige (2018), refers to public procurement as a key driver of change in order to achieve climate neutrality throughout the whole value chain in the construction industry by 2045. The concept public procurement is a process for purchasing goods and services within the public sector (Konkurrensverket 2019), and is regulated by the Act (2016:1145) on Public Procurement. Presently, there are no strict legal requirements to include environmental or climate concern in public procurement, according to the Swedish Public Procurement Act (2016:1145), a contracting authority should consider environmental concern in public procurement if the nature of the contract justifies it (4 chap. 3§). Consequently, in the research field, multiple studies indicate that an obstacle when incorporating environmental and climate aspects in public procurement is linked to legal aspects (Ruparathna & Hewage 2015; Wedin 2009; Sourani & Sohail 2011; Varnäs 2008; Fossil Fritt Sverige 2018).

In order to eliminate obstacles that prevail within the public sector when incorporating environmental and climate consideration in procurement, further research is required. This statement is based on various studies indicating that several obstacles prevail within the public sector in order to increase climate-friendly procurement and thereby climate-friendly construction. Since previous studies within the field focus on the environmental aspects and not specifically the climate aspect of public procurement, a study that investigates the climate aspect of public procurement is required. As this would increase the current research field, and enlighten actors within the construction industry, as well as the society at large that everyone must take responsibility for counteracting climate change and reduce the negative climate impact from the construction industry.

1.2. Problem description

The construction industry is a contributing factor to negative climate impact due to its use of materials and energy resulting in harmful emissions of greenhouse gases to the atmosphere. To prevent and counteract the negative climate impact from the construction industry a combination of client requirements, market initiatives, clear climate goals and long-term instruments contribute to the conversion of the construction industry towards a more climate-friendly construction (Fossil Fritt Sverige 2018). Since environmental and climate conscious construction companies are dependent of clients demanding climate-smart solutions to reduce climate impact, it is of great importance that clients possess the knowledge and resources required in this issue. Also, that the conditions regarding legal requirements are strict enough to promote climate-friendly construction. Identified by several researchers, lack of knowledge, lack of resources and legal aspects are obstacles when incorporating environmental and climate concern in public procurement (Ruparathna & Hewage 2015; Sourani & Sohail 2011). In current research, there is absence of studies investigating specifically the climate aspect in public procurement within the construction industry. Therefore, a study that investigates climate concern in public procurement is needed to increase the research field.

1.3. Purpose & aim

The purpose of this Master's thesis is to create an understanding of how public actors manage climate issues with regards to local policies in the local market by focusing on public procurement situations in the construction industry. This Master's thesis project aims to evaluate possibilities and obstacles of increasing climate considerations in construction projects, along with an investigation of current actions regarding the issue.

RQ1 What possibilities and obstacles are there when incorporating climate considerations in public procurement?

RQ2 How does construction companies manage the work towards the client to increase climate considerations in construction projects?

1.4. Delimitations

The delimitations for this Master's thesis occurs in determining construction context and target group. For this Master's thesis the construction context and target group will be delimited to buildings and public actors. The geographical

limitation in the selection of interviewees among public actors will be within the district of Värmland, and also where Skanska AB believes there is market potential. The type of procurement will be limited to public procurement, focusing on the climate part of public procurement and how it is regulated by law. For this Master's thesis, only Swedish legislations will be considered.

1.5. Report structure

The structure of the report is according to the following: In the second chapter of the report, the theoretical background will be presented. Thence, in the third chapter of the report, the method used for the study will be put forward. Followed by empirics and results that will be displayed in the fourth chapter of the report. In the fifth chapter of the report, the discussion section will be presented. Followed by the conclusions in the sixth chapter of the report. References and appendices will be put forward in the end of the report.

2. Theoretical background

The theoretical background serves as an explanatory paragraph dealing with important concepts and processes that are part of the study's focus area. The theoretical references are mostly accounting for environmental aspects in public procurement, obstacles when incorporating environmental aspects in public procurement and partnering. The chapter concludes with a summarizing theoretical framework that accounts for what aspects intersects in climate conscious public procurement and how the presented theory orients the empirical inquiry.

In current research, there is a lack of studies investigating specifically the climate aspect in public procurement within the construction industry. Therefore, this study will also address the environmental aspect. For this study, a literature review was conducted in order to create an understanding of how the current research area appears in the field. In order to find useful material the databases *OneSearch* and *Google Scholar* were used. In the search for useful material the following keywords were used: *Public Procurement, Green Procurement, Construction Industry, Climate-friendly Construction, Green Construction, Environmental Friendly Construction* and *Partnering*.

2.1. Public procurement

Public procurement is a process for purchasing goods and services within the public sector (Konkurrensverket 2019). The public sector is financed by public funds and consists of national and local public actors who provide the public with goods and services by replying to the public's demand (Hutt & Speh 2017). It is characterized by the dominance of political rather than economic objectives, primacy of the citizen rather than of the consumer and the need to serve multiple multi-dimensional customers (Oni 2018). Wedin (2009, p. 13) refers to public procurement as "an economic activity that ensures that society operates well in terms of the provisions of public services". Purchase by public actors are usually processed by qualified tenderers who respond to a publication of a contract notice for goods and services through tenders (Hutt & Speh 2017). Public procurement in Sweden is regulated by the Act (2016:1145) on Public Procurement.

2.1.1. The Swedish Public Procurement Act

The Swedish Public Procurement Act (2016:1145) is primarily based on EU directives which serves as an important part of the work to promote free movement of goods and services within the EU, by following the Swedish procurement regulations, contracting authorities and entities comply the

obligations arising from the EU law (Konkurrensverket 2019). The Swedish Public Procurement Act (2016:1145) applies to procurements carried out by a contracting authority (1 chap. 2§) such as state or municipal authority (Konkurrensverket 2019). General rules and principles of public procurement highlight, among other things, the importance of contracting authorities treating suppliers in an equal and non-discriminatory way (4 chap. 1§), and that a procurement cannot be designed in order to limit competition so that certain suppliers are favored or disadvantaged (4 chap. 2§). The Swedish Public Procurement Act (2016:1145) is built upon five fundamental principles based on EU law: the principle of *non-discrimination*, the principle of *equal treatment*, the principle of *transparency*, the principle of *proportionality* and lastly the principle of *mutual recognition* (Konkurrensverket 2019). According to the Swedish Public Procurement Act (2016:1145), a contracting authority should consider environmental concerns in public procurement if the nature of the contract justifies it (4 chap. 3§).

2.1.2. Environmental and climate aspects in public procurement

In 1998, the Swedish government presented a report regarding ecological sustainability and highlighted the fact that the demand for climate-friendly solutions must increase and that public procurement is a powerful tool to drive the development of climate work forward (Regeringskansliet 1998).

> The integration of environmental considerations into decision making processes and in particular the regulation of public procurement has become the topic of much debate over the past decade, not least within the European Union. (Wedin 2009, p. 15)

The Cabinet's Committee for Ecologically Sustainable Procurement (CESP) has worked since early 1998 to promote ecologically sustainable procurement within the public sector (Lundqvist 2004). Currently, the roadmap for fossil-free competitiveness developed by Fossil Fritt Sverige (2018), refers to public procurement as a key driver of change in order to achieve climate neutrality throughout the whole value chain in the construction industry by 2045. Furtherly, indicated by CESP the development and incorporation of climate aspects in procurement are essential in the work towards a more climate-friendly future (Lundqvist 2004). Fossil Fritt Sverige (2018) encourages the Swedish parliament and government to utilize public procurement as a tool in the process of climate conversion and strengthen the knowledge regarding the Swedish Public Procurement Act (2016:1145) among public procurers and

ensure that the requirements are met through follow-up. Fossil Fritt Sverige (2018) states that in order to include climate aspects in public procurement, the procurer must possess a high level of knowledge regarding how to set requirements in procurement to reduce climate impact. A qualitative study conducted by Varnäs (2008) investigated environmental requirements in procurement in the construction industry and found that public actors include environmental requirements to some extent. The type of environmental requirements found was: waste disposal both in the construction and operating phase, environmental plan during the construction phase, work environment requirements, the contractor's environmental management system, requirements regarding choice of materials and harmful substances or chemicals (Varnäs 2008). Despite this, Fossil Fritt Sverige (2018) claim that generally there is a knowledge gap that counteracts environmental and climate requirements in procurement. The currently used requirements are often too cautious and does not reduce climate impact, instead it provides information regarding where the emissions take place and the magnitude of them (Fossil Fritt Sverige 2018).

2.1.3. Obstacles when incorporating environmental and climate aspects in public procurement

In the literature, multiple studies found that an obstacle that often occurred was linked to economic aspects (Ruparathna & Hewage 2015; Wedin 2009; Sourani & Sohail 2011; Fossil Fritt Sverige 2018). Ruparathna & Hewage (2015) conducted a mixed methods research and evaluated obstacles in the Canadian construction industry of incorporating environmental aspects in procurement. One of the obstacles found based on empirical data collected through questionnaires and semi-structured interviews with both public and private actors was the lack of funding (Ruparathna & Hewage 2015). Wedin (2009) presented an outcome of a study that investigated obstacles when incorporating environmental concerns in public procurement where one of the obstacles found was lean budgets. In addition to this, Sourani & Sohail (2011) conducted a study that investigated the obstacles to implement sustainability concerns in public procurement strategies within the construction sector in the UK. The obstacles found from the empirical data based on interviewing sustainability professionals and experts within the public sector was the lack of funding and economic aspects (Sourani & Sohail 2011). Wedin (2009) explains that the reason to why public actors refrain from using environmental aspects in public procurement is because environmental friendly choices of goods and services are perceived to be too expensive. Fossil Fritt Sverige (2018) states that in the

long run, it is highly likely that being less dependent on climate-negative materials and processes will pay off economically and reduce risks.

Another common obstacle derived from the literature when incorporating environmental aspects in public procurement is linked to legal aspects (Ruparathna & Hewage 2015; Wedin 2009; Sourani & Sohail 2011; Varnäs 2008; Fossil Fritt Sverige 2018). According to both Ruparathna & Hewage (2015) and Sourani & Sohail (2011) insufficient policies and regulations are classified as obstacles when incorporating environmental aspects in public procurement. Varnäs (2008) found that one of the obstacles counteracting the increase in environmental requirements in procurement is linked to legal concerns. Wedin (2009) explains that the reason to why public actors refrain from using environmental aspects in public procurement is because they fear that tenderers who have not been awarded the contract will initiate a review procedure which may cause delays of the project due to long legal processes. Therefore, Fossil Fritt Sverige (2018) urges politicians to introduce ambitious, long-term and predictable legal requirements for the construction industry in order to increase climate-friendly construction.

Furtherly, a common obstacle derived from the literature when incorporating environmental aspects in public procurement is linked to lack of knowledge (Ruparathna & Hewage 2015; Sourani & Sohail 2011; Varnäs 2008; Mokhlesian 2014; Fossil Fritt Sverige 2018). According to both Ruparathna & Hewage (2015) and Sourani & Sohail (2011) lack of awareness, lack of understanding and lack of information are classified as obstacles when incorporating environmental aspects in public procurement. Varnäs (2008) found that one of the obstacles counteracting the increase in environmental requirements in procurement is linked to lack of knowledge. In addition to this, Mokhlesian (2014) highlighted that purchase with regards to environmental and climate-friendly aspects are prevented due to lack of knowledge. According to Fossil Fritt Sverige (2018) generally there is a knowledge gap that counteracts environmental and climate requirements in procurement, therefore actors within the construction sector must strengthen basic knowledge in order to reduce climate impact.

From the literature review it was also found that a common obstacle when incorporating environmental aspects in public procurement is linked to lack of resources (Ruparathna & Hewage 2015; Sourani & Sohail 2011; Wedin 2009; Fossil Fritt Sverige 2018). According to both Ruparathna & Hewage (2015) and Sourani & Sohail (2011) lack of resources is classified as an obstacle when

incorporating environmental aspects in public procurement. Wedin (2009) explains that the reason as to why public actors refrain from using environmental aspects in public procurement is because there is a lack of administrative resources in the public sector, and therefore, public procurers prefer to use criteria in procurement situations that are easy to evaluate and manage. According to Fossil Fritt Sverige (2018), for small[1] and medium-sized[2] companies, the climate adjustment is both a challenge and an opportunity since smaller companies can quickly adjust and makes changes but they often lack the finances to adopt new and untested solutions. Therefore, they must wait for standardized and tested solutions in order to adjust (Fossil Fritt Sverige 2018).

Other obstacles that are mentioned in the literature when incorporating environmental aspects in public procurement are: lack of demand (Ruparathna & Hewage 2015; Sourani & Sohail 2011; Mokhlesian 2014), resistance to change (Sourani & Sohail 2011; Mokhlesian 2014) and lack of research and development (Sourani & Sohail 2011). Mokhlesian (2014) explains that the reason to why there is a resistance to change is due to the fear to adapt new methods and approaches.

In Table 2.1, a summary of the obstacles found in the literature are presented along with their theoretical references.

Table 2.1. Summary of obstacles found in the literature

Obstacles	References
Economic aspects	(Ruparathna & Hewage 2015; Wedin 2009; Sourani & Sohail 2011; Fossil Fritt Sverige 2018)
Legal aspects	(Ruparathna & Hewage 2015; Wedin 2009; Sourani & Sohail 2011; Varnäs 2008; Fossil Fritt Sverige 2018)
Lack of knowledge	(Ruparathna & Hewage 2015; Sourani & Sohail 2011; Varnäs 2008; Mokhlesian 2014; Fossil Fritt Sverige 2018)
Lack of resources	(Ruparathna & Hewage 2015; Wedin 2009; Sourani & Sohail 2011; Fossil Fritt Sverige 2018)

[1] Small company: 10-49 employees (Ekonomifakta 2018).
[2] Medium-sized company: 50-249 employees (Ekonomifakta 2018).

Lack of demand	(Ruparathna & Hewage 2015; Sourani & Sohail 2011; Mokhlesian 2014)
Resistance to change	(Sourani & Sohail 2011; Mokhlesian 2014)
Lack of research and development	(Sourani & Sohail 2011)

2.2. Project based business

The general definition of a project in marketing literature is defined as "a complex transaction designed specifically to create assets that produce benefits for the buyer over an extended period of time" (Cova et al. 1996, p. 647). Project based business are different from producers of standard goods and services (Cova & Hoskins 1997). The main difference is that project based business must meet demands of individual actors rather than a market segment, as is the case for producers of standard goods and services (Cova & Hoskins 1997). According to Cova et al. (1996) the traditional unit of analysing projects in business markets are through competitive bids. In recent years, project marketing scholars have shifted focus from the narrow perspective of analysing a project where the common unit of analysis is focused on attributes of the project or the parent organization, to a broader perspective observing the project from a network perspective built up of relationship marketing (Pedeliento 2012). The general description of project marketing in marketing literature is that it relies to a great extent on being able to maintain purposeful relationships (Cova & Hoskins 1997).

2.2.1. Relationship marketing

In business marketing research, relationships within business markets are considered to be an important phenomenon (Håkansson & Snehota 1994). Hutt & Speh (2017) describe relationships within business markets as close and enduring. In the 1980s and 1990s, companies within business markets shifted their focus from observing the interaction between buyers and sellers as a transaction to a broader long-term perspective focusing on developing a relationship between buyers and sellers in order to achieve competitive advantage for future desired projects (Cova et al. 1996). Anderson & Narus (1998) argue that commitment and trust are two extremely important factors in order to achieve successful business relationships.

> Relationship commitment is the extent to which both parties believe and feel the relationship is worth spending energy to maintain and promote. In turn, trust is the level of confidence that both parties have in each other and their willingness to open themselves to the other party. (Hutt & Speh 2017, p. 50)

When business relationships grow and develop between two actors a bond arises between the actors, characterized by commitment and trust (Håkansson & Snehota 1994). Kenis & Oerlemans (2007) strengthens the importance of developing relationships in business markets by stating that the focus has shifted from observing individual actors to observing actors within a network where actors interact with each other through different activities. Egan (1998) argue that, based on other industries major improvements in this issue, in order to improve the UK construction industry in terms of quality and efficiency, a key factor is the development of long-term relationships between actors within the supply chain.

2.3. Partnering

In recent years, there has been an increasing interest of the concept partnering among scholars in the research field. Research in the field indicate that a range of criteria in terms of time, cost, quality, etc. would experience major improvements if actors adopted a more collaborative and relationship based interaction (Bresnen & Marshall 2000). In order to achieve a successful business relationship, in e.g. partnering, commitment and trust between actors are two extremely important ingredients (Anderson & Narus 1998). In 1991, the Construction Industry Institute defined the concept partnering as:

> A long-term commitment by two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture without regard to organization boundaries. The relationship is based upon trust, dedication to common goals, and an understanding of each other's individual expectations and values. Expected benefits include improved efficiency and cost-effectiveness, increased opportunity for innovation, and the continuous improvement of quality products and services. (Hosseini et al. 2018, p. 2)

Hosseini et al. (2018) argue that partnering is a suitable business method to apply in the construction industry since construction projects often are referred to as low efficient.

> Construction projects are often associated with low efficiency, mostly due to the significant focus on transactions. […] By focusing on relationships rather than transactions, partnering facilitates increased efficiency, avoids conflicts and eliminates adversarial relationships. (Hosseini et al. 2018, p. 2)

Gadde & Dubois (2010) mentions that one of the underlying reasons to why the construction sector is often associated with low efficiency and performance is because of the deficiencies in traditional procurement methods. Fossil Fritt Sverige (2018) argues that increased collaboration between partners in the value chain are desirable because business relationships tend to be short-term, therefore, partnering and collaboration during procurement are beneficial since knowledge can be utilized between actors, and partners can together develop climate-smart solutions. One of the major advantage of partnering is that knowledge and information can be better utilized since partnering is based on collaboration where knowledge and information flow between the different partners (Mokhlesian 2014).

According to (Mokhlesian 2014) there is a lack of studies investigating supplier selection in relation to construction projects that focuses on environmental and climate aspects in procurement processes. Mokhlesian (2014) argue that partnering is an advantageous method to use when it comes to environmentally friendly projects, as it enables sharing knowledge between the different partners. Knowledge sharing between partners may also entail risks. In order to prevent shared knowledge to be used in other contexts beyond its intendent purpose, trust and commitment should be built up between the partners (Mokhlesian 2014).

> As construction projects are getting more uncertain and complex, and the scope is getting more ambitious, it becomes increasingly difficult to meet the objectives. This is the situation with for example retrofit and green building projects, which have become more in demand in recent years. According to literature, partnering can help uncertain and complex projects where innovation is needed to meet their objectives. (Wøien et al. 2016, p. 238)

To furtherly clarify an important literature finding for this Master's thesis, Wøien et al. (2016) argue that the key to succeed in complex and uncertain green construction projects are knowledge and information sharing between partners through relationship based business characterized by commitment and trust.

2.4. Theoretical framework

The theoretical framework serves as a summarizing part that accounts for what aspects intersects in climate conscious public procurement and how the presented theory orients the empirical inquiry of the study. From the theoretical background it emerged that this issue can be viewed from three different perspectives: *construction companies*, *public actors* and *legislation*, see Figure 2.1.

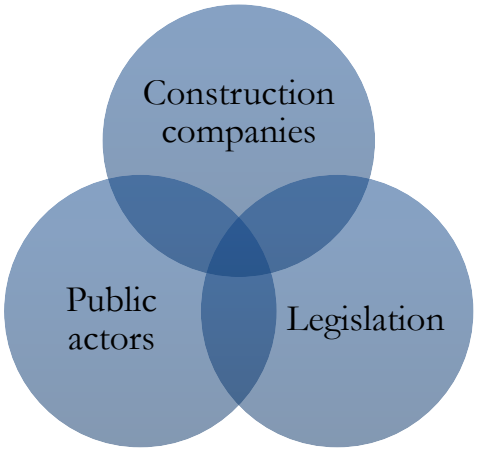

Figure 2.1. The Venn diagram illustrates the three different perspectives. Illustrated by author.

When observing the issue theoretically from the public actor perspective it emerged that generally there is a knowledge gap that counteracts environmental and climate requirements in procurement (Fossil Fritt Sverige 2018). Several theoretical references strengthens that lack of knowledge is an obstacle when incorporating environmental and climate aspects in public procurement viewed from a public actor perspective (Ruparathna & Hewage 2015; Sourani & Sohail 2011; Varnäs 2008; Mokhlesian 2014). When observing the issue theoretically from the public actor perspective it also emerged that lack of resources is an obstacle when incorporating environmental and climate aspects in public procurement (Ruparathna & Hewage 2015; Wedin 2009; Sourani & Sohail 2011; Fossil Fritt Sverige 2018). Wedin (2009) explains that the reason as to why public actors refrain from using environmental aspects in public procurement is because there is a lack of administrative resources in the public sector and therefore, public procurers prefer to use criteria in procurement situations that are easy to evaluate and manage. Besides lack of knowledge and resources, from the theoretical review it also emerged that legal aspects are labeled as an obstacle when incorporating environmental and climate requirements in public procurement (Ruparathna & Hewage 2015; Sourani & Sohail 2011; Varnäs 2008; Mokhlesian 2014; Fossil Fritt Sverige 2018). Wedin (2009) explains that

the reason as to why public actors refrain from using environmental aspects in public procurement is because they fear that tenderers who have not been awarded the contract will initiate a review procedure which may cause delays of the project due to long legal processes.

A suggested strategy to tackle the fact that public actors within the construction industry lacks knowledge and resources regarding environmental and climate-friendly construction viewed from a construction company perspective, is through partnering (Fossil Fritt Sverige 2018). Mokhlesian (2014) argue that partnering is an advantageous method to use when it comes to environmental and climate-friendly projects as it enables knowledge and resource sharing between different partners, and therefore, can counteract the lack of knowledge and resources that prevails within the public sector. A suggested strategy to tackle obstacles related to legal aspects is to urge politicians to introduce ambitious, long-term and predictable legal requirements for the construction industry in order to increase climate-friendly construction (Fossil Fritt Sverige 2018). Viewed from the legislation perspective public procurement is regulated by the Swedish Public Procurement Act (2016:1145), and currently, a contracting authority should consider environmental concerns in public procurement if the nature of the contract justifies it (4 chap. 3§). This means that presently, there are no strict legal requirements when incorporating environmental or climate aspects in public procurement (Fossil Fritt Sverige 2018). The incorporation of stricter legal requirements in public procurement are therefore, due to its volume, of significant importance in the process of restructuring the construction industry towards a more climate-friendly construction (Fossil Fritt Sverige 2018).

3. Method

The method chapter describes and presents the used research design in order to answer the research questions and fulfill the purpose and aim of the study. An in-depth description of the research approach that forms the basis of the study and the method used to collect data and perform the data analysis will be put forward in the method section.

3.1. Research approach

The main purpose of the study is to create an understanding of how public actors manage climate issues with regards to local policies in the local market by focusing on public procurement situations in the construction industry. Since the focus of the study is understanding people's actions and how they account for their actions by applying a holistic view of the study a qualitative research approach was applied (Gray 2017).

This study forms a case study that applies an abductive systematic combining approach. Understanding how public actors manage climate issues with regards to local policies in the local market by focusing on public procurement situations in the construction industry forms the case study. According to Dubois & Gadde (2002, p. 555), case studies are often described as a linear process and argue that:

> The researcher, by constantly going 'back and forth' from one type of research and activity to another and between empirical observations and theory, is able to expand his understanding of both theory and empirical phenomena. (Dubois & Gadde 2002, p. 555)

The deductive and inductive approach creates a mixture which forms the abductive approach that this study has adopted through the process of going back and forth between the theoretical framework, empirics and the analysis of the study. According to Dubois & Gadde (2002, p. 556), "systematic combining can be described as a nonlinear, path-dependent process of combining efforts with the ultimate objective of matching theory and reality".

In order to answer the research questions and fulfill the purpose and aim of the study a theoretical review was conducted which describe the current research situation within the area and what aspects intersect in climate conscious public procurement. In addition to this, an empirical study was performed in order to verify and confirm the theory and answer the research questions.

3.2. Data collection method

For this study, both primary and secondary data was collected in order to answer the research questions and fulfill the purpose and aim of the study. Primary data is defined as data that has been collected by the researcher, and secondary data is defined as data that has already been collected for a different purpose (Gray 2017). For this research, primary data was collected through interviews, and secondary data was mainly collected from contract documents and sources containing relevant information for the study.

3.2.1. Primary data collection

For this study, the data was mainly collected through external interviews with public actors that are potential customers to construction firms and internal interviews at the case company Skanska AB. According to Gray (2017), interviews are a preferable method to use in research when it comes to an in-depth research of people's attitudes, opinions and actions. For this research, semi-structured interviews were used since it is a preferable and commonly used method in qualitative analysis (Gray 2017).

In the preparation stage of the interview process the researcher created interview guides for both external and internal interviews consisting of prepared questions. In the implementation phase of the interview process the prepared questions in the interview guides served as a reminder for the researcher of what areas needed to be covered, and were asked depending on the interviewees answers. In some of the interviews new subjects and issues appeared which led to additional non-prepared questions being asked by the researcher. This method is advocated by Arsel (2017, p. 939), saying that "you should have in hand a set of themes to explore while being open to the new direction presented by each interviewee".

The interviews were conducted by the researcher face-to-face at the interviewee's locations in most cases, with a deviation in two of the cases. In one of the deviating cases the interview was conducted at the researcher's location and in the other case the interview was conducted using Skype, because of the geographical distance. Each interview started with a presentation of the researcher and a brief description of the study, the interviewees were also informed for what purpose the data was collected and how it will be used in the study. Each interviewee was also informed about confidentiality and asked permission to audio record the interview. For this study, a total of eight external

and three internal interviews were conducted. The selected participants for the interviews were based on recommendations from the supervisors at the case company Skanska AB. The guidelines were that the interviewees are located within the district of Värmland and where the supervisors at the case company Skanska AB believed there was market potential.

The external interviews were conducted in Karlstad, Kil, Forshaga, Hammarö, Säffle and Torsby within the district of Värmland, see Figure 3.2.

Figure 3.2. Geographical description of external interviews in the district of Värmland. Illustrated by author.

The participants for the external interviews were contacted by phone using contact information provided by the supervisors at the case company. The external interviews were conducted at municipalities, local authorities and municipal-owned real estate companies, see Table 3.2.

Table 3.2. External interviews within the district of Värmland

	Job role	Organization type	Date and length
A	CEO	Municipal-owned real estate company	18.03.2019 (30 min)
B	Property Manager	Local authority	19.03.2019 (30 min)
C	CEO	Municipal-owned real estate company	20.03.2019 (30 min)
D	CEO	Municipal-owned real estate company	25.03.2019 (40 min)
E	Purchasing Manager	Municipality	25.03.2019 (30 min)
F	Property Engineer	Municipal-owned real estate company	03.04.2019 (35 min)
G	CEO	Municipal-owned real estate company	04.04.2019 (30 min
H	Manager of real estate project	Municipality	09.04.2019 (25 min)

The internal interviews were conducted at the case company Skanska AB, see Table 3.3.

Table 3.3. Internal interviews at the case company Skanska AB

	Job role	Organization	Date and length
I	Green Business Developer	Skanska AB	19.03.2019 (1 h)
J	Group Manager of climate neutrality	Skanska AB	29.03.2019 (50 min)
K	District Manager	Skanska AB	02.04.2019 (20 min)

3.2.2. Secondary data collection

In addition to the collected primary data, secondary data was collected from organizational documents used in public procurement, and other relevant sources for this study. According to Gray (2017, p. 726), "One of the challenges facing researcher is not so much in finding secondary data, but rather in deciding

how to put limits on what is collected." Therefore, the researcher studied parts from the contract documents of great relevance to the study, namely, the environmental and climate part, and also how it is weighted and evaluated according to the evaluation model of the contract document. For this study, two organizational documents were studied: the contract document regarding the construction projects *'Hoppet'* and *'Sundsta-Älvkulle High School'*, see Table 3.4.

Table 3.4. Description of the construction projects *'Hoppet'* and *'Sundsta-Älvkulle High School'*

Construction project (contracting authority)	Description of project
Hoppet (The City of Gothenburg)	Sweden's first fossil-free construction project regarding all stages and an initiative to stimulate innovation, generate knowledge and create better conditions for fossil-free construction.
Sundsta-Älvkulle High School (Karlstad Municipality)	The project is both a renovation project of already existing house bodies and new constructions. The environmental aspects are incorporated into the project by partly using wooden based construction materials both for load-bearing structures and visible surface layers such as floors and walls. The new house bodies are constructed and certified according to Miljöbyggnad Silver[3].

The construction project *'Hoppet'* is located outside the district of Värmland, and thereby, the studied contract document is outside the geographical delimitation of the study. However, since public procurement documents including environmental and climate aspects are rare it was deemed that the said document was ok to use for this research.

In addition to studying public procurement documents, the researcher also searched for sources containing information regarding carbon footprints and material properties for construction materials. Information regarding carbon footprints were found using the report *Carbon footprint for building products* written

[3] Miljöbyggnad is a Swedish system for environmental certification of buildings. Miljöbyggnad Silver is a clear indication that the construction company or the owner of the property is involved in environmental issues and it also requires effort above legal requirements. (SGBC 2019)

by Ruuska (2013), along with the webpage Svensktträ (2018). Values regarding material properties were obtained from the software CES Edupack.

3.3. Data analysis method

According to Gray (2017, p. 867) "qualitative analysis is (or should be) a rigorous and logical process through which data are given meaning". In this study, data was analyzed using thematic analysis which is a common method for analyzing qualitative data.

3.3.1. Thematic analysis

For this study, the primary data was analyzed using thematic analysis. Braun & Clarke (2006, p. 6) states that "thematic analysis is a method for identifying, analysing, reporting patterns (themes) within data". To perform a credible and productive analysis, one must define what is classified as a theme. According to Braun & Clarke (2006, p. 10) "a theme captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set". The thematic analysis approach consists of 6 phases, see Figure 3.3.

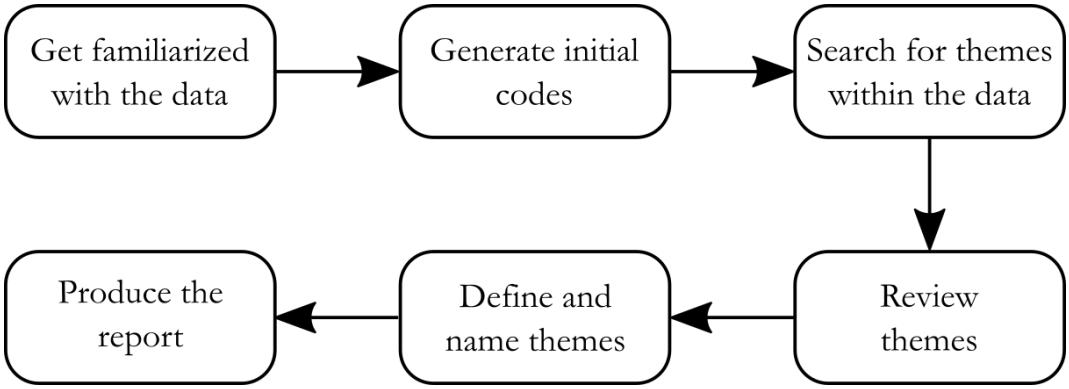

Figure 3.3. Thematic analysis process. Illustrated by author.

In the first phase the researcher transcribed the data and read through the entire data set in order to get familiarized with the collected data. Since the interviews were audio recorded the researcher transcribed the collected data by converting the audio recorded interviews into written form by manually writing out the interviews verbatim. According to Gray (2017) the ideal way of collecting data through interviews is to audio record and fully transcribe the data. The audio recorded interviews corresponded to a total of 88 pages of transcribed data. For this study, a 30 minutes audio recorded interview approximately took 1 hour and 30 minutes to transcribe into words. By summarizing the whole process of conducting the interviews and transcribing the data, for this study the interview

process took approximately 25 hours. Once the collected data was transcribed and re-read by the researcher the next step in the thematic analysis process was to generate initial codes within the data. The coding was performed manually by systematically identifying potential patterns or segments of data. The patterns or segments of data were noted using highlighters or 'post-it' notes. In the third phase the researcher divided the data into themes using the notes from the second phase of the thematic analysis approach. In the fourth phase the researcher reviewed the themes and compared the themes to the generated codes and the entire data set. In the fifth phase the researcher defined and named the themes in a way that suited the entire data set. Lastly, in the sixth phase the researcher produced the report. (Braun & Clarke 2006)

3.3.2. Secondary data analysis

For this study, the secondary data was analyzed by constantly questioning the relevance of the data in relation to the research questions of the study. A step by step process of evaluating secondary data to ensure quality of the entire resulting dataset is presented by Johnston (2014):

> The following evaluative steps should be followed in order to determine […] quality of the primary study and the resulting dataset: (a) what was the purpose of this study; (b) who was responsible for collecting the information; (c) what information was actually collected; (d) when was the information collected; (e) how was the information obtained; and (f) how consistent is the information obtained from one source with information available from other sources. (Johnston 2014, p. 622)

In addition to the constant process of evaluating the relevance of the data, the researcher also evaluated the credibility of the data. In order to account for credible and trustworthy data, the collected secondary data was compared to other sources.

3.4. Trustworthiness and transparency

The qualitative research method has faced a lot of criticism and resistance by skeptics who claim that the method is lacking quality. In order to achieve quality and build trustworthiness and transparency in a qualitative research, a suggested approach is to focus on following four quality criteria: *dependability*, *credibility*, *confirmability* and *transferability* (Gray 2017). According to (Moon et al. 2016) dependability is explained by the following definition.

> How can one determine whether the findings of an inquiry would be consistently repeated if the inquiry were replicated with the same (or similar) subjects (respondents) in the same (or similar) context? (Moon et al. 2016, p. 2).

For this study, the quality criteria dependability was managed by describing the research method in detail. Along with detailed descriptions of the interviews such as job role, organization type and length of the interviews, see Table 3.1 & Table 3.2, geographical limitations, see Figure 3.2, and the interview questions, see Appendix 1 & Appendix 2. Name of interviewees was omitted due to promised confidentiality. According to (Moon et al. 2016) credibility is explained by the following definition.

> How can one establish confidence in the "truth" of the findings of a particular inquiry for the subjects (respondents) with which and the context in which the inquire was carried out? (Moon et al. 2016, p. 2).

For this study, the quality criteria credibility was managed by supporting the findings with the theoretical framework. Also, the researcher aimed to conduct the interviews with public actors at municipalities, local authorities and municipal-owned real estate companies with a job role at the top of the hierarchy to ensure that the participants of the interviews possess high knowledge of the organization. According to (Moon et al. 2016) confirmability is explained by the following definition.

> How can one establish the degree to which the findings of an inquiry are a function solely of the subjects (respondents) and conditions of the inquiry and not of the biases, motivations, interests, perspectives and so on of the inquirer? (Moon et al. 2016, p. 2)

For this study, the quality criteria confirmability was managed by applying a holistic and objective view of the study. Also, by remaining objective when the interview guides were created and throughout the interviews. One major challenge was to clarify interview questions without being subjective and influencing. This was avoided by objectively explaining the interview question for the interviewee. The quality criteria confirmability was also managed by audio recording the interviews which facilitated the data analysis and prevented data from being omitted or manipulated by the researcher's interpreting. According to (Moon et al. 2016) transferability is explained by the following definition.

> How can one determine the degree to which the findings of a particular inquiry may have applicability in other contexts or with other subjects (respondents)? (Moon et al. 2016, p. 3).

For this study, the qualitative criteria transferability was managed by describing the method in detail to facilitate and enable the study to be used in other contexts.

4. Findings

The findings chapter presents the empirical results and findings of the study based on the interview responses and secondary data analysis. The outcome of the external interviews presents themes related to possibilities and obstacles when incorporating climate considerations in public procurement. The outcome of the internal interviews presents themes related to current actions in order to increase climate-friendly construction. The outcome from the secondary data analysis strengthens the empirical findings of the interviews.

4.1. Possibilities

In Table 4.5, possibilities when incorporating climate considerations in public procurement are presented as themes. The themes are developed from the collected empirical data from interviewing external actor within the public sector through thematic analysis. A total of two themes related to possibilities were found: *high level of ambition* and *environmental requirements in procurement*.

Table 4.5. Possibilities presented as themes developed from empirical data

Possibilities	Description
High level of ambition	From the interviews it emerged that a high level of ambition regarding the climate area prevails within the public sector. The high level of ambition was mainly related to the energy area and choice of materials.
Environmental requirements in procurement	From the interviews it emerged that environmental requirements are included in procurement to some extent within the public sector. The type of environmental requirements was mainly related to the energy area and choice of material or the environmental requirements in public procurement are left unspecified.

4.1.1. High level of ambition

All interviewees stated that high ambitions prevails within the organization when it comes to the climate area. Respondent D stated that "It is a wish from the board that we must keep up, we must all be involved in the climate issue. We want this and we want to be a part of the process". An often occurring reason to why the interviewees possess high ambitions within the climate area are pressure from tenants.

> It is partly our tenant's interest, we get pressure and they want us to work in this way, with sustainability issues, low energy consumption, good environmental choices. It is about meeting the markets expectations and keeping good quality of what we deliver to our customers as well. (Respondent C)

Another mentioned reason to why the interviewees possess high ambitions within the climate area is because the society at large is moving towards that direction. Also that there is a greater awareness among people.

> Climate issues is something that becomes more and more important, and more people become aware of it, there are pressure from different directions, from our tenants, from society, from environmental organizations, our own goals as well. Even what politicians set up, there is a greater awareness, I believe. (Respondent G)

In conjunction to the statements that there prevails high ambition regarding the climate area within the organization, two focus areas were mentioned. The area that appeared among all interviewees was the energy area. Respondent B stated that "We work a lot with the energy consumption." And Respondent F stated that "We have worked extensively on energy investments in recent years." (Respondent F). Another area that appeared among some of the interviewees was the choice of materials. Respondent A expressed that "We look at material selection that it is approved according to Basta[4]." And Respondent B stated that "We focus on energy consumption, but we also focus on what construction materials we use. We have an environmental database were we register all our materials." Respondent G stated that "We work with good material selection, we put a lot of time into improving our properties from energy and environmental perspective. But it is mainly energy issues that we work with". The energy area were by far the area that appeared most times during the interviews followed by choice of material.

4.1.2. Environmental requirements in public procurement

Some interviewees stated that some level of environmental requirements are included in public procurement. The environmental requirements that are included in public procurement has mainly been connected to the energy area and choice of materials. Respondent E stated that in procurement situations the organization includes "Energy requirements and choice of materials".

[4] Basta is a scientific based tool used to minimize and exclude hazardous materials in construction products (Basta 2019).

Respondent G mentioned that environmental requirements are included but they remain open and unspecified.

> In procurement we demand that it should be good environmental choices, usually we have not decided more than that. We have no requirements of certification, but we require that one should have an environmental plan and a person in charge of the environmental field, we also demand that product choices are documented and that they have no environmental impact. (Respondent G)

Also requirements left unspecified can be within quality and environmental management systems. Respondent H stated that "We set and evaluate criteria that can be about quality and environmental management systems."

4.2. Environmental and climate aspects in public procurement

Section 4.2 showcase contract documents of how environmental and climate aspects are incorporated and evaluated in public procurement.

4.2.1. The construction project 'Hoppet'

The evaluation of the tender is based on following criteria: *the contractor's organization*, *the collaboration process*, *environmental goals* and *cost efficiency*. Within the framework of each of the evaluation criteria, the tender receives scores according to the evaluation model presented in Table 4.6.

Table 4.6. Tender evaluation model for the construction project *'Hoppet'*.

No.	Evaluation criteria	Maximum score	Percentage
1	The contractor's organization	9	12,9
2	The collaboration process	18	25,7
3	Environmental goals	35	50
4	Cost efficiency	8	11,4
	Total score	70	100

Table 4.6 shows that the criteria *environmental goals* accounts for 50 percent of the entire tender evaluation model. Furthermore, the criteria *environmental goals* with a maximum score of 35 is weighted and evaluated based on following model, see Table 4.7.

Table 4.7. Weighting and evaluation model of environmental consideration for the construction project *'Hoppet'*

No.	Question	Maximum score	Percentage
1	Describe the approach and tools contributing that all actors within the project work towards the goal of achieving a fossil-free preschool.	5,5	15,7
2	Describe the approach and tools to identify products approved by the environmental requirements of the project regarding fossil-free raw material and manufacturing.	12,5	35,7
3	Describe the approach and tools to set up transports from manufacturing to construction site approved by the environmental requirements of the project regarding fossil-free construction at the construction site.	5,5	15,7
4	Describe the approach and tools to set up logistics at the construction site approved by the environmental requirements of the project regarding fossil-free construction at the construction site.	8,5	24,3
5	What long-term effects do you see that the construction and innovation project can result in?	3	8,6
	Total score	35	100

Table 4.7 shows that the criteria *environmental goals* is largely evaluated according to the approach and tools of identifying products approved by the environmental requirements of the project. The mentioned accounts for 35,7 percent of the total score. Followed by the approach and tools to set up logistics at the construction site approved by the environmental requirements of the project that accounts for 24,3 percent of the total score. The approach and tools of getting all actors within the project work towards achieving a fossil-free preschool and to set up transport from manufacturing to construction site

approved by the environmental requirements of the project both accounts for 15,7 percent. Lastly, an evaluation of what long-term effect regarding construction and innovation projects can result in accounts for 8,6 percent.

In summary, the proportion of environmental consideration for the construction project *'Hoppet'* measured from the contract document is 50 percent, see Table 4.6.

4.2.2. The construction project 'Sundsta-Älvkulle High School'

The evaluation of the tender is based on following criteria: *the company and its values*, *project organization*, *approach for partnering*, *economy* and *social considerations*. Within the framework of each of the evaluation criteria, the tender receives scores according to the evaluation model presented in Table 4.8.

Table 4.8. Tender evaluation model for the construction project *'Sundsta-Älvkulle High School'*

No.	Evaluation criteria	Maximum score	Percentage
1	The company and its values	3,5	5
2	Project organization	35	50
3	Approach for partnering	21	30
4	Economy	7	10
5	Social considerations	3,5	5
	Total score	70	100

Furthermore, the criteria *approach for partnering* with a maximum score of 21 is weighted and evaluated based on following model, see Table 4.9.

Table 4.9. Weighting and evaluation model of environmental consideration for the construction project *'Sundsta-Älvkulle High School'*

No.	Question	Maximum score	Percentage
1	Describe the approach, system and routines of the project regarding procurement.	1,05	5
2	Describe the approach, system and routines of the project regarding communication.	2,10	10

3	Describe the approach, system and routines of the project regarding planning.	3,15	15
4	Describe the approach, system and routines of the project regarding management accounting.	8,40	40
5	Describe the approach, system and routines of the project regarding environmental and quality management.	6,30	30
	Total score	21	100

Table 4.9 shows that the environmental aspect (No. 5) of the criteria *approach for partnering* accounts for 30 percent of the total score.

In summary, with regards to both the evaluation model of all criteria, see Table 4.8, and specifically the criteria *approach for partnering*, the environmental aspect, see No. 5 in Table 4.9, is evaluated by 9 percent. Thereby, the proportion of environmental consideration for the construction project *'Sundsta-Älvkulle High School'* measured from the contract document is 9 percent.

4.3. Obstacles

In Table 4.10, obstacles when incorporating climate considerations in public procurement are presented as themes. The themes are developed from the collected empirical data from interviewing external actors within the public sector through thematic analysis. A total of five themes related to obstacles have been found: *lack of resources*, *lack of knowledge*, *legal aspects*, *economic aspect* and *technical aspects*.

Table 4.10. Obstacles presented as themes developed from empirical data

Obstacles	Description
Economic aspects	From the interviews it emerged that actors within the public sector perceive that climate-smart solutions are expensive and that economic aspects are prioritized.
Legal aspects	From the interviews it emerged that actors within the public sector experience that public procurement is difficult to manage since it is regulated by the Act (2016:1145) on Public Procurement.

Lack of knowledge	From the interviews it emerged that there is a lack of knowledge regarding the climate area within the public sector.
Lack of resources	From the interviews it emerged that there is a lack of resources to tackle climate issues within the public sector.
Technical aspects	From the interviews it emerged that there are purely technical obstacles to promote climate-friendly work. The technical obstacles was mainly related to choice of materials.

4.3.1. Economic aspects

Some interviewees expressed that one obstacles as to why climate issues are not given more attention within their organization is because of the economic aspects being the controlling factor in most cases. Respondent D stated that "Besides knowledge, it can be an economic obstacle".

> One obstacle is always economy. It usually costs more money in the short-term. One has to be able to make life cycle analysis and long-term assessments and value so that we get a price on what it costs. (Respondent G)

In addition to this, Respondent A stated that "There must be a financial incentive in including the climate aspects more so that it becomes profitable from a business point of view."

4.3.2. Legal aspects

Some interviewees expressed that one obstacles to why climate issues are not given higher attention within their organization is because public procurement is regulated by the Act (2016:1145) on Public Procurement. Since public procurement is regulated by law it is describes to sometimes be perceived as stiff and hard to manage. "The Act on Public Procurement is terribly rigid and bound, you have to buy what you are asking for, and we do not get to see the solutions in all aspects" (Respondent A). In addition to this statement, respondent B expressed that "The Act on Public Procurement is not always so practical for us. It raises some issues. It is difficult to set requirements, it is an art to set the right requirements in procurement."

Another issue that has been highlighted as a legal concern to why climate aspects are not given higher attention within their organization is because public actors are avoiding review procedure.

> New issues will rise in procurement when you see that the legal situation is clear and when someone comes up with new ideas and sets new requirements and that is being reviewed and when decisions are taken in this case we will see how this is observed by the legislator. A bit of a dilemma is that we have an area where we know what requirements we can set and then we have a gray area where it can go well but we don't know for sure, the risk is that review procedure is initiated which can lead to a delay of the project for about six months, so it is not entirely the fault of the Act on Public Procurement, it is also because the legal process requires a lot of time. (Respondent E)

4.3.3. Lack of knowledge

Some interviewees expressed that one obstacles to why climate issues are not given higher attention within their organization is because of the lack of knowledge within the area.

> There is a very high ambition, but the knowledge needs to increase. Pretty much actually. In such a small organization as we are, even if we are a municipal-owned real estate company, we are only seven employees so we have no specialists within the area, I believe that it is required to have specialists' knowledge within this area. (Respondent B)

Another highlighted issue is that the knowledge must increase within the whole construction industry as well, not only within the municipalities and municipal-owned real estate companies. Respondent A stated that "We must have more knowledge in the industry regarding energy-efficient solutions and sustainable solutions." Also that the knowledge within wood constructions must increase. "We cannot replace a wooden construction with a concreate construction and believe that we get the same solution, so wooden construction must develop much more" (Respondent A).

4.3.4. Lack of resources

Some interviewees expressed that one obstacle to why climate issues are not given higher attention within their organization is because of the lack of resources. Respondent C stated that "The obstacle that exists is that we are a

small company and do not have the resources, so resources is our biggest obstacle". This statement is supported by several interviewees.

> We need more people who can devote themselves to this issue, and there is absolutely more to do. One obstacles is definitely related to resources, we need to get more people to have this mindset, because we know that things happen if you set aside resources to only work on certain issues, then you get the focus on these questions. That is what we really need. (Respondent B)

A highlighted issue in relation to lack of resources is that the board does not want to pressure the employees despite the fact that there is an ambition regarding the climate area within the organization. Respondent F mentioned that "Our CEO has an ambition to keep up and meet what is required in the climate field now, but since I am retiring, she doesn't want to pressure the others since they are taking over some of my work."

4.3.5. Technical aspects

Some interviewees expressed that one obstacles to why climate issues are not given higher attention within their organization is that purely technical aspects must be prioritized in order to create a durable construction. Respondent C stated that "The technical part gets the most attention in our organization, we are technicians and builders and we want to construct durable buildings." Respondent D also stated that "We focus on the technical solutions". The technical aspects that were mentioned during the interviews was mainly related to choice of materials.

> If we talk about wood versus concrete constructions, wooden constructions must develop, we cannot replace a concrete construction to a wooden construction and believe that we get the same construction solutions, therefore wooden constructions must develop more within the whole industry. (Respondent A)

> When it comes to sustainability issues I am skeptical to the solution of replacing concrete constructions to wooden constructions. I understand that concrete is a polluter and I hope that the concrete industry keeps developing their product to that it becomes less polluting as it is today when it is manufactured. When I think from a sustainability perspective and a durable building that should last a long time without the need to be renovated, then I believe that concrete is a much more sustainable construction material. (Respondent F)

A highlighted reason to why concrete construction is perceived to be a preferable choice of material from a technical point of view is because the building would better cope a fire. Respondent A stated that "A huge disadvantage of wooden constructions is that they are not advantageous in case of a fire." In addition to this, Respondent F stated that "I have an example where the entire attic burned off and according to the rescue service it was thanks to concrete joists that the whole building didn't burn down."

4.4. Comparison of construction materials

Section 4.4 showcase a comparison of carbon footprint and material properties from the construction materials concrete and wood based construction materials such as glulam[5].

4.4.1. Comparison of carbon footprint for construction materials

In Table 4.11, a comparison of carbon footprint based on the manufacturing process for the construction materials concrete and glulam are presented.

Table 4.11. Comparison of carbon footprint based on the manufacturing process of the construction materials concrete and glulam (Ruuska 2013)

Construction materials	CO_2-e g/kg
Aerated concrete block, Europe	442
Glulam, Sweden	109

According to Ruuska (2013) concrete has almost four times higher carbon footprint compared glulam based on the manufacturing process, see Table 4.11. In Figure 4.4, a comparison of construction materials and their carbon dioxide emission from the manufacturing process are presented.

[5] Glulam is a wood based construction material and mainly used as beams and pillars in construction where high load-bearing capacity and efficient material utilization are required (Byggbeskrivningar 2017).

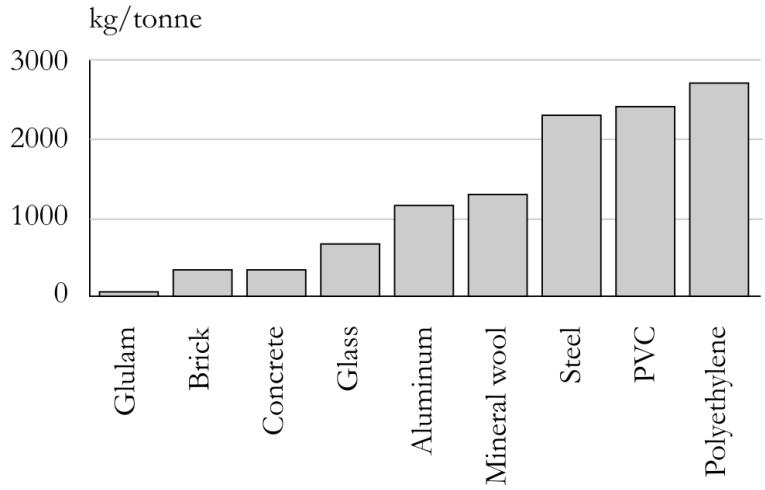

Figure 4.4. Comparison of carbon dioxide emission from the manufacturing process of construction materials. Diagram illustrated by author, reconstructed from (Svenskträ 2018).

Figure 4.4 shows that the carbon dioxide emissions from the manufacturing process of concrete is higher than the manufacturing process of glulam.

4.4.2. Comparison of material properties for construction materials

In table 4.12, a comparison of material properties for the construction materials concrete and glulam are presented.

Table 4.12. Comparison of material properties for the construction materials concrete and glulam, values obtained from the software CES Edupack

Material property	Concrete	Glulam
Compressive strength (MPa)	13,3-30	8,3-11
Stiffness (GPa)	15-25	12-14
Flammability	Non-flammable	Highly flammable

Table 4.12 shows that concrete has almost a three times higher compressive strength and almost a two times higher stiffness when evaluating the best case scenario compared to glulam. Also, from a fire protection point of view concrete has a good fire resistance compared to glulam, see Table 4.12.

4.5. Current actions to increase climate aspects in public procurement

In Table 4.13, current actions when incorporating climate considerations in public procurement are presented as themes. The themes are developed from the collected empirical data from interviewing internal actors within the case

company Skanska AB through thematic analysis. A total of two themes related to current actions have been found: *developing long-term relationships with customers* and *partnering*.

Table 4.13. Current actions presented as themes developed from the empirical data

Current actions	Description
Partnering	From the interviews it emerged that construction companies aim to transfer customers to partnering. The main reason for this is to get a chance to participate and work together in projects during the earlier stages.
Developing long-term relationships with customers	From the interviews it emerged that construction companies aim to develop long-term relationships with customers. The main reason for this is to create relationships with customers that are characterized by trust and commitment to "win" desirable projects in the future.

4.5.1. Partnering

Partnering is one of the business strategies that can be incorporated in order to increase climate considerations in projects by transferring customers from fixed price[6] to partnering in order to get a chance to participate in earlier stages of the projects.

> If we are procured at a fixed price, the customer must set clear requirements regarding how we should work with the climate area. In a fixed price procurement, we as an actor will not do more than what is required since we do not get paid for it. But in a partnering we work together towards common goals, and we have the climate area as a factor which becomes much easier to work with since we have a closer dialogue with the customers and can find the optimal level of ambition together. (Respondent I)

It also emerged that the interviewees believe that partnering is a procurement method to be preferred when it comes to larger and more complex projects.

[6] At a fixed price, buyers and sellers agree on the final price before the contract is written (Eriksson & Hane 2014)

> There is always a breakpoint when partnering projects become too simple for it to be profitable, both for the customers and the supplier. Partnering requires more effort both from the customers and the supplier so when you come down to a certain breakpoint in project size that I believe is at 50 million SEK per years in project volume. (Respondent K)

4.5.1. Developing long-term relationships with customers

One of the business strategies in order to increase climate considerations in projects is to develop long-term relationships with customers. Respondent I stated that "It is about getting to know you customer and understand what they do and what they consider as important and also developing and maintaining a long-term relationship."

> In long-term customer relationships we can work together, to develop together and to arrive at smart solutions. If we get into the early stage we can build a relationship with the customer, and this is when we really get good projects, the ones that are more innovative. (Respondent K)

In addition to this, a strategy to develop long-term relationships with customers within construction companies is to raise the issue with customers.

> We try to get our organization to schedule customer meetings and raise the issue with customers to get them interested, and then we can show how we can contribute and, among other things, we can help hem calculate the climate impact in their construction projects and be able to contribute with solutions. (Respondent J)

5. Discussion

The discussion chapter presents an interpretation and aims to connect theory and empirics by discussing the theoretical background and empirical findings. The theoretical background is carefully used in the discussion section in order to discuss and interpret the generated empirical findings.

5.1. Possibilities and obstacles

According to the theoretical references found during the literature review one of the obstacles when incorporating environmental aspects in public procurement was linked to economic aspects. Wedin (2009) explained that the reason for this is because the general perception is that environmentally friendly solutions are considered to be too expensive among public actors. That economic aspects would be an obstacle when incorporating environmental concerns in public procurement within the construction industry is confirmed by the empirical findings of this study. According to the empirical findings it is evidenced that some interviewees expressed that one obstacle to why climate issues are not given higher attention within their organization is because of the economic aspects being the controlling factor in most cases. Fossil Fritt Sverige (2018) presented a counter-argument to this, stating that in the long run, it is highly likely that being less dependent on climate-negative materials and processes will pay off economically and reduce risks. That climate-smart solutions costs more money in the short-term and that life cycle analysis are needed for long-term assessments are a general perception, evidenced to some extent by the empirical findings.

Another obstacle found during the literature review was linked to legal aspects. Wedin (2009) explained that public actors refrain from using environmental aspects in public procurement because they want to avoid a review procedure to initiate. A review procedure may cause delays of the project due to long legal processes and is therefore, a time consuming and slowing process for public actors. That legal aspects would be an obstacle when incorporating environmental concerns in public procurement within the construction industry, correlates with the empirical findings of this study. From the empirical findings it appears that some interviewees expressed that the Act (2016:1145) on Public Procurement complicates the implementation of climate considerations in public procurement. In order to prevent a review procedure to initiate, public actors therefore, procure through safe methods and set the type of requirements they are already familiar with. Since a general rule and

principle of public procurement is that contracting authorities should treat suppliers in an equal and non-discriminatory way (4 chap. 1§), and that a procurement cannot be designed in order to limit competition so that certain suppliers are favored or disadvantaged (4 chap. 2§), some procurers may find it difficult to set the right requirements. For instance, requiring organizations who locally produce materials to promote climate-friendly work and reduce transport and thereby, the use of fossil fuels would mean that the procurer violates the Act (2016:1145) on Public Procurement. The explanation for this is based on the fact that suppliers who import their material outside the limits of the requirement are discriminated and have the right to appeal since the requirements are not being set according to the Act (2016:1145) on Public Procurement.

Another obstacle found during the literature review was linked to lack of knowledge. The theoretical reference Fossil Fritt Sverige (2018) stated that generally there is a knowledge gap among public actors that counteracts environmental and climate requirements in procurement. That lack of knowledge would be an obstacle when incorporating environmental concerns in public procurement within the construction industry, is confirmed by the empirical findings of this study. According to the empirical findings some interviewees expressed that the lack of knowledge within the climate area was an obstacle as to why climate issues are not given higher attention within their organization. This undoubtedly creates obstacles in the development of climate and environmental considerations in the construction industry since knowledge is an important factor to success. This statement is evidenced by Fossil Fritt Sverige (2018), who argues that in order to include climate aspects in public procurement, the procurer must possess a high level of knowledge regarding how to set requirements in procurement to reduce climate impact. Supported by the empirical findings, currently procurers have a high level of ambition in the area regarding energy and the choice of materials. That some level of environmental requirements are included in public procurement is acknowledged but still quite rare. However, there are in general no requirements that dominate in the climate area, hence, the construction project *'Hoppet'* is an initiative to generate knowledge and spread a message to other public actors. As Fossil Fritt Sverige (2018) stated, the currently used requirements are often too cautious and does not reduce climate impact. Instead it provides information regarding where the emissions take place and the magnitude of them.

Another obstacle found during the literature review was linked to lack of resources. Wedin (2009) explained that the reason for this is because public procurers prefer to use criteria that are easy to evaluate due to lack of administrative resources. That lack of resources would be an obstacle when incorporating environmental concerns in public procurement within the construction industry is confirmed by the empirical findings of this study. In the empirical findings it appears that lack of resources is an explanation for why environmental and climate considerations are not given higher attention within their organizations. From theory it is confirmed that for small or medium-sized companies the climate adjustment is both an obstacle and an opportunity. It is an obstacle because smaller companies may not have the finances to invest in climate-smart solutions that are still new to the market and an opportunity since they can easily adapt because they are a small company.

Further, additional obstacles that have been found in theory are: lack of demand, resistance to change and lack of research and development. That lack of demand and resistance to change would be an obstacle are not distinctly confirmed by the empirical findings of this study. However, that the lack of demand would be an obstacle is validated by several theoretical references and, not least, by the case company's own explanations in this issue (Skanska 2019; Fossil Fritt Sverige 2018). That resistance to change and lack of research and development would be an obstacle, are vaguely confirmed by the theoretical findings but not to the same extent as the previously analyzed.

In this research, it was also found that one of the obstacles when incorporating environmental and climate concerns in public procurement, are related to technical aspects. From the empirical findings it emerged that technical aspects are a significant factor when it comes to material selection for construction items. According to the empirical findings, two materials and their properties are mainly discussed: *concrete* and *wood*. Concrete is one of our most important construction materials, in construction items it is primarily used for pillars, beams, joists, load-bearing walls etc. (Burström 1999). The manufacturing process of concrete is a more environmentally damaging than the manufacturing process of wood based construction materials such as glulam. An important component of concrete is cement and the production of cement emits carbon dioxide which labels concrete as a polluting construction material (Svensk Betong 2018). From the empirical findings it emerged that the construction material concrete is often prioritized due to its advantageous material properties. It emerged from the empirical findings that material properties related to the

strength and flammability of the material was the reason to why concrete based construction was prioritized instead of wood based construction materials, although concrete is a more polluting during its manufacturing process. From the empirical findings, it is evidenced that public actors prioritize to construct and build durable construction items and therefore, prefer concrete instead of wood based construction materials. In section 4.4.1 it is proven that the manufacturing process of wood based construction materials, such as glulam, has almost four times less carbon footprint compared to concrete. Despite this fact, public actors prefer concrete as a construction material instead of wood based construction materials. The empirical explanation to this is that concrete has beneficial material properties when it comes to compressive strength, stiffness and flammability. From the empirical findings one can claim that a general perceive is that concrete is a more beneficial construction material when it comes to the durability and strength of the building and that it can withstand a fire better compared to wood based construction materials. The mentioned benefits of concrete are therefore, in the most cases to prefer although wood based construction materials have a lower carbon footprint during its manufacturing process and is a more climate-friendly construction material.

In summary, the empirical evidence shows that possibilities when incorporating climate concerns in public procurement exists, since there is a high level of ambition to keep up among public actors. However, due to lack of knowledge and resources in the public sector the construction companies striving towards a more climate-friendly construction gets counteracted. Supported by the theoretical references and the empirical findings, there are no clear indications that clients incorporate climate concern in public procurement, but environmental concern are included to some extent. Once again, the high level of ambition to keep up among public actors strengthens the fact that the awareness regarding the climate area is increasing among public actors. The empirical evidence also shows that there are several obstacles that counteract increased climate considerations in the construction industry. To overcome these obstacles increased knowledge and resources are required both when it comes to the climate area and the legal aspects. This statements is strengthen by the fact that if a public procurer have more knowledge about the climate area and how to set the right requirements, the procurer will be more confident and comfortable in working towards a reduced climate impact if that is the goal. According to the empirical findings, procurers tend to procure according to safe methods due to lack of knowledge. Therefore, if organizations want to take additional steps toward reduced climate impact, more knowledge is required.

5.2. Current actions to increase climate aspects in public procurement

According to the theoretical references a suggested method to increase climate considerations in the construction industry is to adopt partnering since it utilizes knowledge and information sharing between partners (Mokhlesian 2014; Wøien et al. 2016). That the concept partnering would be a beneficial strategy to adopt in order to increase climate-friendly construction, is confirmed by the empirical findings of this study. By the empirical findings it is confirmed that a well-conscious strategy is to transfer customers to partnering. Thus, enabling the chance to participate and work together in projects during the earlier stages. From theory it is evidenced that in order to achieve a successful business relationship, in e.g. partnering, commitment and trust between partners are two extremely important ingredients. The empirical findings confirms that a strategy is to create long-term relationships with customers that are characterized by trust and commitment to "win" desirable projects in the future. From theory, it is also stated that partnering can be suited as a win-win method for both partners in the issue, not only for the construction company. Except the fact that partnering increases efficiency and quality (Bresnen & Marshall 2000; Hosseini et al. 2018; Egan 1998), it also creates an opportunity for partners to exchange information and knowledge under the conditions that trust and commitment prevail between the parties (Mokhlesian 2014; Wøien et al. 2016). Therefore, it is argued that for clients that possess high level of ambition to increase climate-friendly construction but lacks knowledge regarding the issue, can benefit from partnering, since partnering enables knowledge sharing between partners. In order for this to be a suitable method to increase climate-friendly construction at least one of the partners must possess the knowledge necessary. Also, there must be a relationship characterized by trust between the parties (Mokhlesian 2014). From the empirical findings it is evidenced that in order to create trust between business partners the approach is to get to know the customer and understand what they value and consider as important through customer meetings, projects and other activities where the two parties interact.

In summary, an explicit strategy for construction companies to increase climate-friendly construction is among other things to create long-term relationships with customers that are characterized by trust and commitment and transfer the customers to partnering to get a change to participate and work together in projects in earlier stages. This enables construction companies that strive towards a more climate-friendly future to be involved in earlier stages of the

project. It also enables the opportunity to raise the climate issue with the customer, and if it turns out that the customer has a high level of ambition, but lacks knowledge of how to proceed, the construction company can assist with the knowledge and methods required to achieve set goals.

6. Conclusion

The final chapter presents the most important conclusions from the study regarding theoretical insights and empirical findings. This section also presents the limitations of the study, in what way this study contribute to the current research area and also suggestions for future research.

This study has been investigating potential possibilities and obstacles for construction companies increasing climate considerations in construction projects. The purpose of this Master's thesis is to create an understanding of how public actors manage climate issues with regards to local policies in the local market by focusing on public procurement. In this final chapter, the most important conclusions based on both the theoretical references and empirical findings will be presented in order to answer the research questions of the study:

RQ1 What possibilities and obstacles are there when incorporating climate considerations in public procurement?

RQ2 How does construction companies manage the work towards the client to increase climate considerations in construction projects?

In theory, there are no indications that possibilities prevail when incorporating climate considerations, rather the opposite arguing that currently requirements are too cautious and does not directly reduce climate impact, instead it provides information regarding the emissions. This is also evidenced by the empirical findings showing that clients set requirements mostly in relation to environmental concern and not specifically climate concern. On the other hand, it can be a possibility that customers possess environmental awareness as this can lead to increased climate awareness as well. In research, several theoretical references reinforce that the obstacles when incorporating climate considerations in public procurement are related to: *economic aspects*, *legal aspects*, *lack of knowledge* and *lack of resources*. That the mentioned would be obstacles regarding the issue are strongly confirmed by the empirical findings of the study and further discussed in the discussion section of the report. Besides the mentioned obstacles, this study has discovered that *technical aspects* can be an obstacle when incorporating climate considerations in public procurement.

The theoretical references reinforce that partnering is a beneficial method to adopt in order to increase climate-friendly construction, therefore, partnering can be considered as a potential strategy in this issue. The empirical findings of this study confirm that a well-conscious strategy used by construction companies is to transfer customers to partnering in order to work together and

share knowledge between partners in earlier stages. From the empirical findings it also emerged that a well-conscious strategy is to develop long-term relationships with customers in order to increase trust and commitment between the parties and "win" desirable projects in the future. The general perception is that partnering and developing long-term relationships with customers are the current actions performed by construction companies to increase climate aspects in construction projects.

6.1. Limitations

One of the limitations of the study is that the study only focuses on the public sector which makes it impossible to generalize the results to the private sector. Due to the time limitation of the research the study was limited to the public sector. Another limitation of the study is that the study only focuses on public actors within the district of Värmland. Once again, due to the time limitation of the research and the geographical distance the study was limited to the public sector within the district of Värmland.

6.2. Contribution to current research

Hopefully this study has contributed to current research and reinforced what has already been established by theory. Since there is a lack of studies investigating in supplier selection in relation to construction projects that focuses on climate aspects in procurement processes, this study has contributed to that area. There are many studies that deal with the areas individually but not many that connect both public procurement, construction industry and the climate area. An important insight and contribution from this study is that public actors possess a high level of ambition within the issue but lacks methods to realize the ambitions and work actively to increase climate-friendly construction. Also, that technical aspects can counteract climate-friendly construction.

6.3. Future research

Suggestions for future research is that a similar investigation should be conducted by focusing on the private sector in order to contribute to the research area and increase generalization. Future research should also investigate and evaluate further in how public actors that possess a high level of ambition within the issue can adopt methods and tools in order to realize this. Also, future research should investigate further in the relation between partnering being a beneficial method to use in order to increase climate-friendly construction.

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Appendix 1: Internal interview guide

Date:

Time:

Place:

Respondent

- The interview will be audio recorded if permission is given.
- Interviewee will be promised confidentiality.
- Name:
- Position:
- Organization:
- How long have you worked in this position?
- Can you describe your role in the climate area?
- What are your previous experiences in the climate area?

Climate

1. Can you describe how Skanska currently work with the climate area?
2. Can you describe the development regarding Skanska's work within the climate area?
3. Can you describe which strategies and/or policies Skanska uses in order to drive the climate work forward if there are any?
4. Can you describe which underlying driving forces Skanska uses in order to drive the climate work forward if there are any?
5. Can you describe what obstacles you see by working more actively in the future with the climate area at Skanska if there are any?

Positioning

1. Can you describe how Skanska currently work in order to achieve competitive advantage in the market within the climate area?

2. Can you describe how Skanska currently work in order to position the company at the market regarding supply of solutions developed in order to promote climate consideration in the construction industry?

3. Can you describe how Skanska currently work to understand what creates value for the customer within the climate area?

4. Do you have knowledge regarding how much your desired customers value your products and services within the climate area? If yes, how do you get this knowledge?

5. According to marketing theory it is considered beneficial to create long-term customer relationships characterized by trust and commitment in order to ”win” desirable projects in the future. Is that a strategy that Skanska uses in order to promote climate work in the future? If yes, can you describe how?

Public procurement

1. Can you based on your experiences at Skanska describe how much space the sustainability aspect is usually given by clients in public procurement?

2. Can you based on your experiences at Skanska describe what sustainability dimension of social sustainability, environmental sustainability and economic sustainability is given the largest and the least space in public procurement?

3. How do you experience the competency among public procurers when it comes to environmental sustainability?

4. Can you based on your experiences at Skanska describe which sustainability criteria are frequently used in public procurement?

5. Can you from a future vision of 10 years say what sustainability criteria can most likely be added to public procurement based on the current trend and the development that has taken place in the area?

6. Would you consider public procurement being a powerful tool in order to drive the development of climate work forward? If yes, in what way?

7. Out of fixed price and partnering, what procurement method would you say is best suited in order to increase climate considerations in the construction industry? And why?

Other

1. Would you like to add something to your statements?
2. Can I contact you if I have any future questions or if I need to create clarity in your statements?

Appendix 2: External interview guide

Date:

Time:

Place:

Respondent

- The interview will be audio recorded if permission is given.
- Interviewee will be promised confidentiality.
- Name:
- Position:
- Organization:
- How long have you worked in this position?

Climate

1. Can you describe the competency regarding the sustainability area in your organization?
2. Can you describe how your organization work within the sustainability area?
3. Can you describe what sustainability dimension of social sustainability, environmental sustainability and economic sustainability is given the most and the least space in your organization?
4. Can you describe the development regarding the work within the environmental sustainability in your organization?
5. Can you describe how your organization currently work within the climate area?
6. Can you describe how your organization work with strategies and/or policies in order to drive the climate work forward if there are any?
7. Can you describe which underlying forces your organization work with in order to drive the climate work forward if there are any?

8. Can you describe what obstacles you see by working more actively in the future with the climate area in your organization if there are any?

Public procurement

8. Can you based on your experiences describe how much space the sustainability aspect is usually given in public procurement in your organization?

9. Can you describe which sustainability criteria are used frequently in public procurement in your organization?

10. Can you from a future vision of 10 years say what sustainability criteria can most likely be added to public procurement based on the current trend and the development that has taken place in your organization?

11. Would you consider public procurement being a powerful tool in order to drive the development of climate work forward? If yes, in what way?

12. Out of fixed price and partnering, what procurement method would you say is best suited in order to increase climate considerations in the construction industry? And why?

13. Do you have any general thoughts and thumb rules when you as a client prefer collaboration/partnering?

Other

1. How would you describe Skanska's environmental work in relation to other leading actors within the construction industry in the district of Värmland?

2. This question is asked depending on the answer in question 1: What do these companies do that makes them stand out and being the leading companies?

3. Would you like to add something to your statements?

4. Can I contact you if I have any future questions or if I need to create clarity in your statements?