CHALMERS
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Sustainability Driven Procurement of Building Projects

Incentives and Driving Factors from the Clients' Perspective

Master's thesis in Design and Construction Project Management

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MASTER'S THESIS ACEX30

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ABSTRACT

The construction industry is reported as one of the biggest global industries which accounted 30% global greenhouse gas emissions. The challenge of the construction industry is not merely on the reduction of emissions, but also extended towards other aspects of sustainability, consisting of the environmental, social, and economic pillars of sustainability. Sweden took action to handle the environmental issues by targeting on being climate neutral by 2045. Hence, the Swedish National Board of Housing, Building, and Planning, commonly known as Boverket, took more detailed action by stipulating climate declaration for all new buildings. The property developers play a vital role to boost sustainability in Sweden, since they have an increased influence in the hierarchy of the construction industry.

In this case, the drivers of sustainable development in the construction industry are partially reliant on the clients' requirements requested in every project, as well as their ethics and initiatives. Therefore, this study investigates the state-of-the-art sustainable practices among property developers in Sweden to identify the main challenges in applying sustainable criteria during the procurement phase. This study was carried out by qualitative research which consists of a literature review and an empirical study of semi-structured interviews.

This study resulted in the identification of several common sustainable criteria, covering the three pillars of sustainability and also emphasising the fact that currently the property developers have an increased interest in environmental and economic sustainability, rather than social sustainability. The results of the study also raised the notion of long-term perspective, how it affects the business strategy on sustainability and the different perceptions that exist.

The study concludes that the market demand drives the implementation of the agenda on sustainability, among property developers in Sweden, while providing substantial information that could prove useful in the future development of the national agenda and its regulations.

Keywords: Sustainability, sustainable criteria, sustainable requirements, property developers, procurement, tendering, certification, circular economy, and long-term perspective.

Hållbarhetsdriven upphandling av byggprojekt

Incitament och drivande faktorer ur beställares perspektiv

Examensarbete inom masterprogrammet Master' Organisering och Ledning i Bygg- och Fastighetssektorn

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Avdelningen för byggledning

Chalmers tekniska högskola

SAMMANFATTNING

Byggnadsindustrin ses som en av de största industrierna och står för 30 % av globala utsläpp av växthusgaser. Utmaningen inom industrin är inte bara att minska dessa utsläpp utan innefattar även andra hållbarhetsaspekter rörande de tre pelarna inom hållbarhet: miljö, sociala och ekonomiska. Sverige agerade för att hantera miljöfrågan genom att sikta på att bli klimatneutrala vid 2045. Boverket har därför infört krav om att fastighetsutvecklare ska redovisa information om byggnadsprojekts miljöpåverkan. Fastighetsutvecklare spelar en stor roll i förbättringen av hållbarhet i Sverige eftersom de enklare kan påverka hierarkin i byggnadsindustrin.

Således är drivkrafterna bakom hållbar utveckling i byggnadsindustrin delvis beroende av klienternas önskemål i varje projekt, såväl som deras etik och initiativ. Denna studie undersöker därmed de allra främsta hållbarhetsteknikerna inom fastighetsutveckling i Sverige, för att identifiera huvudsakliga utmaningar med att applicera hållbara kriterium under upphandlingsfasen. Detta arbete utfördes genom kvalitativ efterforskning bestående av en empirisk studie av semistrukturerade intervjuer.

Arbetet resulterade i identifieringen av vanliga hållbarhetskriterium rörande de tre hållbarhetspelarna med betoning på faktumet att fastighetsutvecklare nu har ett ökat intresse för hållbarhet inom ekonomi och miljö hellre än social hållbarhet. Resultaten av studien lyfte även uppfattningen av långsiktigt perspektiv, hur det påverkar affärsstrategi gällande hållbarhet och olika insikter som finns. Arbetet konkluderar att marknadens efterfrågan driver implementeringen av hållbarhetsagendan hos fastighetsutvecklare i Sverige, och presenterar samtidigt viktig information som kan vara viktig vid framtida utveckling av nationell agenda och regelverk.

Nyckelord: Hållbarhet, hållbarhetskriterier, hållbarhetskrav, fastighetsutvecklare, upphandling, certifiering, cirkulär ekonomi och långsiktighet.

Contents

Preface

This Master's thesis has been carried out as a combination between Division Construction Management, the doctoral research project of the Division of Structural Engineering at Chalmers University of Technology Sweden, and NCC Sweden AB. The qualitative study both from literature and empirical study has been executed with the focus on sustainable procurement among Swedish property developers and performed during the period of January to June 2022. The thesis consists of a component to accomplish the authors' education in the Master's Programme *Design and Construction Project Management* of the department of *Architecture and Civil Engineering* at *Chalmers University of Technology*, which was undertaken during the period of January to June 2022 with 30 ECTS.

A debt of gratitude is owed to our supervisors, Rasmus Rempling and Linda Cusumano, for their guidance and assistance along with their expertise throughout the study. The completion of this study could not have been viable without the support of Martine Buser, our program director, both during our thesis study but also throughout our studies. In addition, we would like to thank the interviewees for their virtue, whose insights and knowledge into the subject matter have given us substantial inputs in enhancing the authenticity and reliability in the outcome of our thesis.

Last but not least, we would like to thank our families and friends, who have given us emotional support and without them none of this would indeed be possible.

Göteborg June 2022

Ni Made Nindya Desivyana

Orestis Farmakis

Nomenclature

This list is developed to provide the reader with a comprehensive understanding of the way that the following words are used throughout the study of the report.

Client: a property developer that acquires land (buy or rent) and develops residential or commercial properties that they plan to sell or rent with the aim of profit.

Criteria: a test, principle, rule, canon, or standard, by which anything is judged or estimated (Oxford English Dictionary Online, 2022).

Economic Sustainability: refers to practices that support long-term economic growth without negatively impacting social, environmental, and cultural aspects of the community (Office of Sustainability, 2019).

Environmental Sustainability: meeting the resource and services needs of current and future generations without compromising the health of the ecosystems that provide them (Morelli, 2011).

Life Cycle Assessment (LCA): the method/process for evaluating the effects that a product has on the environment over the entire period of its life, thereby increasing resource use efficiency and decreasing liabilities (Glavič & Lukman, 2007).

Life Cycle Costing (LCC): a concept which aims to optimise the total costs of asset ownership, by identifying and quantifying all the significant net expenditures arising during the ownership of an asset (Woodward, 1997).

Procurement: the action of obtaining something; acquisition; an instance of this (Oxford English Dictionary Online, 2022).

Requirements: something called for or demanded; a condition which must be complied with (Oxford English Dictionary Online, 2022).

Social Sustainability: efforts in achieving a fair degree of social homogeneity, equitable income distribution, employment that allows the creation of decent livelihoods, and equitable access to resources and social services, a balance between respect of tradition and innovation, and self-reliance, endogeneity and self-confidence (Sachs, 1999, pp. 32–33).

Socio-economic: Social and economic; that derives from or is concerned with the interaction of social and economic factors (Oxford English Dictionary Online, 2022).

Sustainability: the balance point where the earth's elements, consisting of nature, money, and human, intersect each other and can be gained by protecting and preserving them not only for human interests, but for the continuity of earth and its elements life in the future (Lozano, 2008; Vos, 2007).

Tender: a formal offer duly made by one party to another (Oxford English Dictionary Online, 2022).

1 Introduction

In this chapter, the preliminary knowledge of this research is presented, consisting of the background, aim with its objectives and research questions, scope and limitations, as well as the thesis' outline.

1.1 Background

The activities of exploiting the natural resources, mainly burning fossil fuel to meet the human interest, have led to the rising amounts of greenhouse gases (GHG) in Earth's atmosphere (NASA, 2022). The rise of GHG contents in the atmosphere has caused imbalance and thus considerable climate change. By 2022, NASA reported that the global temperature had risen 1.01°C since 1880, and more specifically, the global temperature in 2020 was 1.02°C, while in 2021 was 0.85°C.

The need of universal goals to tackle environmental, social, and economic sustainability issues in the world has driven the actions taken by the United Nations (UN) that were discussed at the Conference of Rio de Janeiro in 2012. The conference generated 17 key points to resolve the sustainable issues, which are known as the Sustainable Development Goals (SDGs). To pursue the SDGs, Sweden with other UN's member states gathered in 2015 and produced the 2030 sustainable development target to achieve sustainability (Weitz et al., 2015).

In December 2015, the European Union (EU) Commission also reacted upon the sustainable targets by conducting the Paris Agreement with the dedication to resolve the issue of global temperature raising in the future by maintaining it under 2°C, thus lower to 1.5°C and support the countries to face the climate change impact. The main long-term output from the Paris Agreement is the target of adopting a climate-neutral economy with net-zero GHG in 2050 (European Commission, 2022).

Consequently, in June 2017, Sweden's parliament, Riksdag, produced a climate policy framework with several ambitious targets, becoming the foremost player in realising the Paris Agreement. One of the most prominent goals is the target of reducing GHG emissions to zero by 2045 and thereupon negative emissions. The 2045 climate-neutral target can be partially achieved through the reduction of emissions goals in 2030 and 2040, by respectively having emissions 55% and 73% less than in 1990 (Ministry of the Environment, 2018). Riksdag appointed the Swedish National Board of Housing, Building, and Planning (Boverket) who then stipulated a new Climate Declaration regulation, demanded property developers to deliver reports of climate calculations that are related to the construction phase of new buildings (Boverket, 2020).

Furthermore, the Global Status report by the International Energy Agency (IEA) and the UN Environment Programme (2019) revealed that in 2018, the construction industry has contributed on final energy consumption about 36%, on energy and process-related CO_2 emissions around 39%, where 11% of that is caused by the manufacturing of building materials (i.e., steel, cement, glass). In addition, Senaratne et al. (2017) mentioned that GHG and CO_2 emissions come from the consumption of the construction sector in raw materials, cement, and concrete.

Based on Statens Offentliga Utredningar (2007), climate change has a wide range of impacts from environmental issues to economic and social ones. There is a need for more sustainable manner from humans in the industry, and a gradual adjustment in a larger extend. Statens Offentliga Utredningar (2007) also stated that businesses in many areas, such as the construction ones, need to be actively involved in the effort of coping

with the climate change and having a long-term perspective. Thereto, the lack of sustainability understanding and prioritisation of financial profit by the construction companies has been highlighted by Burciaga (2020), where most of the participants do not recognise the economic advantage they can gain, if they implement circular economy models.

With all conditions being the case, there is an urgency for the construction industry players to implement sustainability to solve the climate change issue caused by humans themselves. The top priority right now is to investigate how companies have defined and addressed sustainability. In addition, as stated by the Ministry of Finance (2017), the procurement plays a vital role is achieving climate neutrality goals in Sweden.

There is a number of efforts in the construction industry that tackle the environmental and economic sustainability targets. There is an influence from the market demand and the governmental regulations to take immediate actions on environmental solutions, which illustrates why the focus of property developers has shifted into this direction. On the contrary, social sustainability is placed in the bottom rank of sustainable development, as declared by Zuo et al. (2012). A number of property developers take environmental matters seriously, however, this concern should not be limited only in environmental aspects, while neglecting the other aspects of sustainability, primarily the social aspects. Thereupon, as agreed by Ruparathna and Hewage (2015a), property developers are called to discuss and deal with issues related to social sustainability, hence working conditions, safety, wellbeing of society, and other related issues. Nevertheless, these topics are broad terms that are difficult to quantify and procure.

Another aspect is economic sustainability in relation to the financial survival of the company when developing a project or increasing the invested funds, but currently, there is a consideration on providing solutions with affordable prices for the residents and sustaining affordable living standards in the area. Ultimately, sustainable development should focus on creating a balance between environmental, economic, and social aspects.

Hence, this study composes a penetration towards the sustainability understanding of property developers and how it is addressed in the procurement process. The property developers, being high in the construction hierarchy and having sufficient financial resources and influence, should be able to initiate the revolution in the construction sector in becoming more sustainable. It could be argued that a high level of sustainable maturity is very important for property developers, who are called to cover the increasing demand of housing in Sweden.

In addition, there are many stimulations towards environmental sustainability, such as governmental regulations and certification systems. Contrarily there are too few stimulations towards social sustainability, which makes it natural that in this study both literature and empirical have more information about environmental sustainability criteria and requirements.

By mapping down the efforts, requirements, and criteria towards sustainability, the readers can develop their own ideas and insights on what can be further done, what other sustainable requirements should be promoted, why some aspects of sustainability have failed, and where should the national agenda steer to, aiming to provide better guidelines for the further implementation of sustainable solutions that will assist the sustainable goal achievement.

1.2 Aim

The aim of this study is to investigate the clients' perspective and practices on sustainability requirements within current Swedish property development sector. The focal point of this study is the driving factors of the clients, in framing sustainable requirements during the procurement process, and to what extend these requirements are sufficiently represented in the procurement documents. Eventually, the thesis aims to provide an insight on how the clients evaluate the tendering offers in relation with the sustainability demands that they have requested. The study will give contribution to the industrial doctoral project at the Division of Structural Engineering of Chalmers University of Technology, particularly named "Data and production-driven design using artificial intelligence". The project is supported by the Development Fund of the Swedish Construction Industry (SBUF) and NCC Building Sweden.

1.2.1 Objectives

The following objectives were developed by following the guidelines of Mantzoukas (2008), which are applicable for the formulation of qualitative research questions. The proposed framework provides a coherent connection between the theoretical background and the reality, that assist on developing the research questions in this study.

1. Document the views of sustainability perceived by the clients in the Swedish market.
2. Describe the holistic driving factors of clients for sustainable requirements.
3. Identify the way sustainable requirements are formed by clients in the procurement stage, linked to the knowledge and scale of the company.
4. Construct the frame of the link between the requirements and procurement when it comes to sustainability requirements.
5. Explain how clients react and evaluate tender offers in the procurement process.

1.2.2 Research Questions

Mantzoukas (2008) proposed that the research questions should aim to answer the following considerations. It is important that the research questions specify *who* will be studied, *when* and *where*. In particular, this research focuses on property developers located in Sweden and the purpose is to investigate the current situation of sustainable development. Subsequently, it is important to formulate constructive research questions that would identify *how* the ongoing situation has been constructed. Finally, the author suggests that the research questions should propose the investigation of *what* the variables are consisting of and affecting this reality. Considering also the objectives developed above to achieve the aim of this study, the following Research Questions (RQs) were constructed:

RQ1: What are the incentives that drive property developers in Sweden to adopt criteria for sustainability?

RQ2: How are the sustainable criteria reflected in the procurement stage?

RQ3: How do the property developers in Sweden evaluate tenders offered by contractors regarding sustainability aspects?

RQ4: What are the Swedish property developers' expectations, as the clients, on contractors regarding responsibility for sustainability?

1.3 Scope & Limitations

The study confers about the present clients' perspective on sustainable requirements during the early stage of the project and specifically the initiation of the procurement stage and its processes. A literature study regarding the definition of sustainability and the requirements set out by the clients' perspective will be carried out to examine previous research. The empirical analysis involves several interviews with a variety of property developers in the Swedish industry, as the contributor in data collection, for further qualitative analysis.

More in-depth research about the evaluation of tendering process conducted by clients will provide information to enable a holistic interpretation of clients' expectations on sustainable procurement offered by contractors. Ultimately, a connection between sustainable understanding and the maturity of the company can be drawn and encapsulated.

1.4 Thesis Outline

This report is divided in seven chapters that support the research process of the topic in a way that both theoretical and empirical knowledge are compared and discussed. The chapters are structured as follows.

Chapter 1: Introduction

The first chapter introduces the topic to be discussed and refers to the aim, the scope, and the limitations of the study, so the reader can have a comprehensive view of the research.

Chapter 2: Research Methodology

This chapter proposes the method used for the developing of the research and the processes followed.

Chapter 3: Theoretical Framework

The Theoretical Framework includes the review of existing academic literature related to the topic.

Chapter 4: Empirical Results

The Empirical Results chapter develops and explains the findings of the interviews, that support the research study.

Chapter 5: Analysis

In this chapter, the results from the literature review and the interviews are being compared and analysed in accordance with the themes that were produced during the developing of the empirical results.

Chapter 6: Discussion

This chapter includes the thoughts of the authors that derive from the analysis of the results, while reflecting to the scope of the research questions.

Chapter 7: Conclusion

The last chapter illustrates the results and conclusions of the study and propose further possibilities for research.

2 Research Methodology

This chapter provide a further explanation regarding the methodology that is used in this study, as the efforts to achieve the objectives mentioned in the Chapter 1. It is explained why qualitative research method was selected and provides information on how the literature review and the interviews were conducted. Lastly, the ethics under which the research was conducted are proposed.

2.1 Research Approach

The choice of the research approach chosen is prominent in a study and the selection of the method should follow the epistemological considerations that this research aims to correspond (Bell et al., 2019). This research follows the interpretivism epistemology, which proposes a critical perspective towards the scientific model being assessed and tries to interpret how the human action takes place and give reason to the construction of reality, since it requires "to grasp the subjective meaning of social action" (Bell et al., 2019). The method, that according to the authors serves this epistemological consideration, is the qualitative research method, that focuses on the interpretation of words and images. Creswell (2014) defined qualitative research methods as a way of exploration on case-by-case basis that strongly connected with social and human values. The qualitative method is typically identified by the characteristic of using words rather than numbers as in the quantitative method and may present open-ended data using research questions, suggested also by Bell et al. (2019).

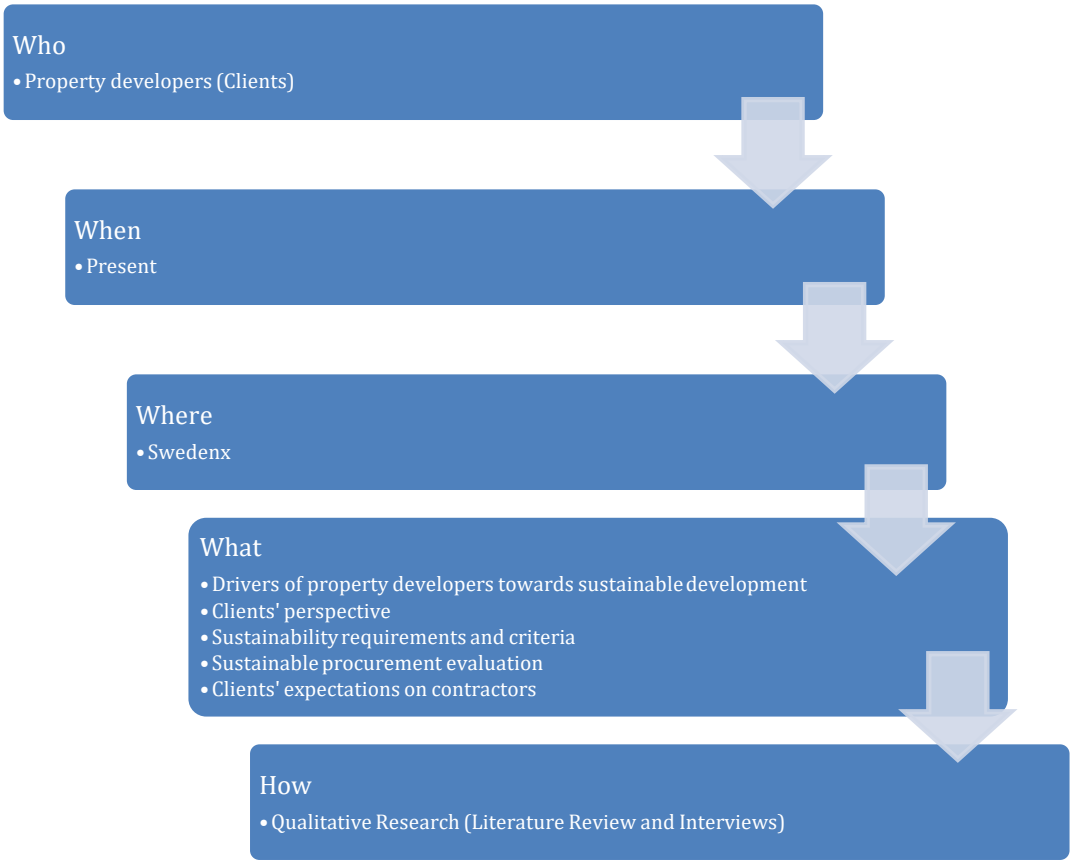

Figure 2.1 Structure of the research study.

2.1.1 Workflow of Research

The reasoning behind the research follows the abductive mode, as proposed by Bell et al. (2019), is because it can be supported by qualitative data. According to the authors, the abductive reasoning is based on explaining and interpreting a phenomenon by exploiting empirical information and combining them with the existing theory, which cannot give answers by itself. This procedure demands constant comparison of empirical and theoretical data to develop explanatory results and is related with the pragmatism perspective. Abductive reasoning is usually applied in interpretive research which proposes "subjective meaning of social action", according to Bell et al. (2019), and exploits the qualitative research approach.

The research process was formulated as following. In the first steps the topic idea was discussed with the supervisors at Chalmers University of Technology and the research questions were structured, bearing in mind the broader research program. In the next stage, the method analysis was executed, and possible ways were discussed on how to address the research questions to satisfy the aim of the research. In the following steps, a thorough literature review was conducted that assisted in the formulation and conceptualization of the empirical part of the study. During the empirical data collection, supplementary literature was investigated to meet the objectives of the research. The process was iterative since additional literature was considered after the collection of the empirical data. In the end, the results were combined, compared, and discussed to reach the final conclusions and assumptions. A simplified version of the workflow process of this study is illustrated in Figure 2.2.

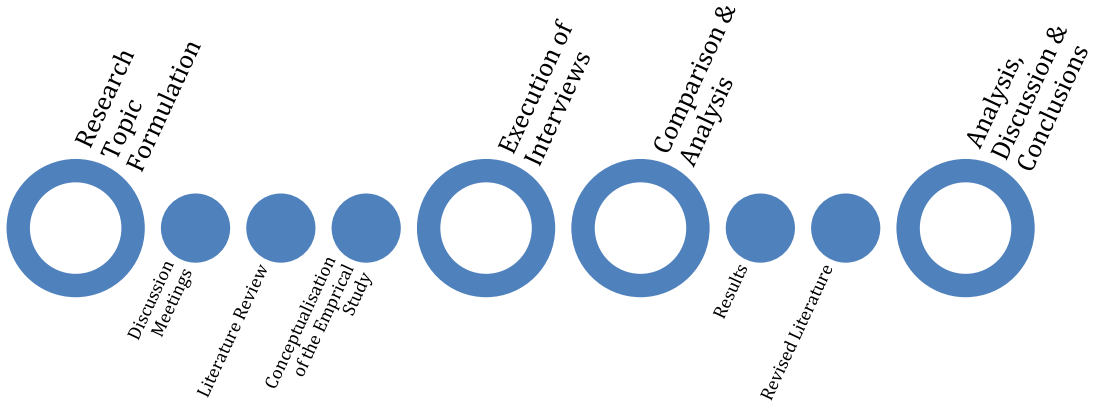

Figure 2.2 Overview of the workflow of the research.

2.2 Literature Research

The theoretical framework is conducted by a literature review of academic and conference papers. Its purpose is to provide scientific knowledge related to the topic by explaining related concepts and definitions, while providing stimuli to assist in framing the interview questions that will support the empirical study. Bell et al. (2019) proposed that the literature review is a valuable tool to reveal inconsistencies and unanswered questions that should be addressed in the empirical research. Thus, the literature review process was categorised into two parts, with the first one being the research of general terms and definitions that has driven the formulation of the topic and the second part

involved more specific articles to be used as a comparison tool that supported the interview questions, which forms the whole process as iterative. This methodology follows the one proposed by Bell et al. (2019), which suggests a preliminary literature review to define what are the terms and keywords related to the research questions. The fact that scientific literature is mainly focused on the public procurement of sustainable projects or because of the limited number of articles concerning the Swedish context, a broader variety of articles were selected to be investigated, aiming on the mapping of the perspective towards sustainable procurement in various locations that could be compared with the Swedish market, which would be conceptualised according to the responses of the interviews.

The databases exploited for this cause were Scopus, Google Scholar, Science Direct and Chalmers Library. The literature review is initiated with the definition of the keywords and terms correspond to the topic and should be researched. A wide variety of articles were selected that were relevant with the topic and facilitated the scope and the limitations of the research. The keywords involved in the first part of the literature review are the following terms: *sustainability, sustainable definition, sustainable requirements, sustainable criteria, construction sustainability, bidding evaluation, tender evaluation, social sustainability, environmental sustainability, financial sustainability, sustainability drivers, sustainability challenges, sustainable procurement, green procurement, sustainable development goals, Boverket climate declaration, property developers, clients expectation etc.* In the second part the keywords used were *building certification, circular economy, type of contracts, Swedish contract, totalentreprenad, utförandeentreprenad, etc*. In the sorting process the articles were evaluated for their credibility. their sufficiency in the justification of the information, as well as their suitability to this research context.

2.3 Empirical Research

The empirical research is based on qualitative research of interviews, conducted with a semi-structure method.

2.3.1 Interviews (qualitative approach)

The interviews of people related to the property development sector were crucial to give an insight of the practical issues raised. Thus, the selection of the profiles of the interviewees was based on the need to facilitate expert's knowledge, while having a holistic view of property development and procurement discussions. The profiles of interviewees come from various backgrounds consisting of business, project, construction, and sustainability managers from companies that focus on property development. Out of the many possible interviewees that were contacted, only eight were available to participate in the interviews, in the period that the study was conducted. A holistic approach to the Swedish market was aimed to be achieved by interviewing companies of different sizes and from different regions in Sweden. Most of the interviews were conducted online, because of distance and the Covid-19 pandemic, but when it was possible in-person interviews were preferred. In the following table, the profiles of the interviewees, meaning their roles, their companies, and their years of experience in the sector are listed in the order that the interviews were conducted (Table 2.1). The interviews were designed as semi-structured, which proposes a general structure on the sequence of the questions that the interviewer would ask, while also allowing the interviewer to change that sequence or make more clarifying questions. This flexible process of interviewing was preferred to facilitate the

identification of patterns, understandings, events, and forms of behaviour (Bell, et al., 2019). The duration of the interviews ranged from one to two hours.

Table 2.1 Profile of the interviewees that participated in the empirical research.

No.	Role	Company	Region	Years of Experience
1	Construction Manager	ÖBO	Örebro	30
2	Project Manager	NCC	Malmö	25
3	Project Manager	Chalmersfastigheter Ab	Gothenburg	4
4	Strategic Development Manager	Ikano Bostad	Stockholm	25
5	Sustainability Manager	Alecta Fastigheter	Stockholm	9
6	Project Manager	Jutabo	Lerum	5
7	Property Developer	NCC	Gothenburg	11
8	Project Manager	Vasakronan	Gothenburg	15

2.4 Analysis

As written in Section 2.1, this study exploits the qualitative research method by conducting interviews and literature review to utilise data and compare them to deliver results and assumptions.

The interviews involved a thematic analysis, which proposes coding and grouping of the empirical results. The thematic analysis method opined by Braun and Clarke (2006), can be utilised as a tool to identify prevalent patterns that are internalised by the interviewees. Therefore, the empirical findings that involved detailed, yet complex information, were analysed by implementing the thematic analysis method which is considered beneficial to handle this type of data. Bell et al. (2019) mentioned that the thematic analysis method is suitable for studies that involve a complex set of data and are defined by unstructured language, especially when dealing with transcripts. Another benefit according to Braun and Clarke (2006) is the results that might be produced from the thematic analysis could potentially be the basis for further research and analysis.

The process of thematic analysis, according to Bell, et al. (2019), aims on identifying possible repetitions, similarities, and differences, while are also matching concepts with the related theory and considering any space for missing data. Braun and Clarke (2006) have proposed a six-step method to perform thematic analysis that aim in developing themes that conclude the similar patterns mentioned above. This procedure was also followed in the study, targeting to achieve an abductive approach. Thus, a data-driven analysis and assumptions are extracted from the results of this analysis.

The six-step process of Braun and Clarke (2006) involved at the first step the familiarisation with the data that were collected by the interviews. This process covers the transcription of all interviews, following by the study of the transcriptions and the extraction of the main points, arguments, and issues. Once all those information were collected, a coding system was generated to group them into categories based on their

similarities that were identified. In sequence, these groups were discussed based on what themes/categories they relate and contribute to. In the next step, these themes are reviewed, and their titles are assessed to investigate their relevance. This process is iterative, which means that revisions and changes occurred in several stages when new insights were considered. Once the themes were finalised, their relations with each other and their contribution to the research questions were defined. Lastly, the written presentation (Chapter 4) of those results followed by giving a holistic perspective of the whole procedure, to the readers of this study.

The analysis is concluded in Chapter 5, where the empirical results are compared with the results that occurred from the literature review. The purpose is to identify which theories are confirmed by the interviewees for the Swedish industry and which results from the literature review do not apply in the Swedish context. In addition, a holistic perspective of how the Swedish market deals with sustainable criteria and requirements is provided, providing the readers with sufficient information on the aspects that could be improved in the future.

2.5 Ethics

This research follows the four main ethical principles proposed by Bell et al. (2019), which is translated to "avoidance of harm; obtaining informed consent; protection of privacy through confidentiality; and preventing deception" (p. 136). In addition, the research was conducted with full accordance to the General Data Protection Regulation (GDPR) and especially in the empirical part. All interviewees were informed about the purpose of the study and were asked for consent to publish information that were considered important for the research as well as their profiles and roles. Quotes from the interviews are not linked with specific names of the participants, but rather their profiles, and consent for the publishing of the final report was asked. Permission for recording the interviews was also one of the highest priorities. Lastly, the results and proposals developed are under the ethics perspective that represents Chalmers University of Technology.

3 Theoretical Framework

In this chapter, literature review from various sources has been constructed with the aim to review the previous research, mainly about sustainability in general and in specific (property development), the pillars that consist of it, as well as what is sustainable procurement, which criteria and requirements are practiced during the procurement phase, what are the different types of contracts and how property developers evaluate the tender offers.

3.1 Sustainability

Sustainability concept, as Lozano (2008) expressed, was historically framed in 1974 when the understanding of Sustainable Societies arose. In 1987, the party who extensively brought the definition of sustainable development to the surface was the *World Commission on the Environment and Development Report* or commonly known as Brundtland Commission. Brundtland define sustainable development as:

> *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*
>
> (Brundtland, 1987)

Hedenus, et al. (2018) explained that the numerous interpretations about the Brundtland's definition of sustainable development have been debated and fragmented. Some research, as uttered by Hedenus, et al. (2018) and Lozano (2008), had limited concern on the environmental dimension and the human responsibility to the planet, and some others accentuated on the social (human) and economic dimensions.

3.1.1 Three aspects of sustainable development

By time, several models of the sustainability definition have been developed, where the fragmentation of the sustainability definition is unavoidable. The Venn diagram, which is one of the well-known models, represents sustainability as the incision that happen when environmental, economic, and societal aspects overlap each other. Figure 3.1 below illustrates the Venn diagram.

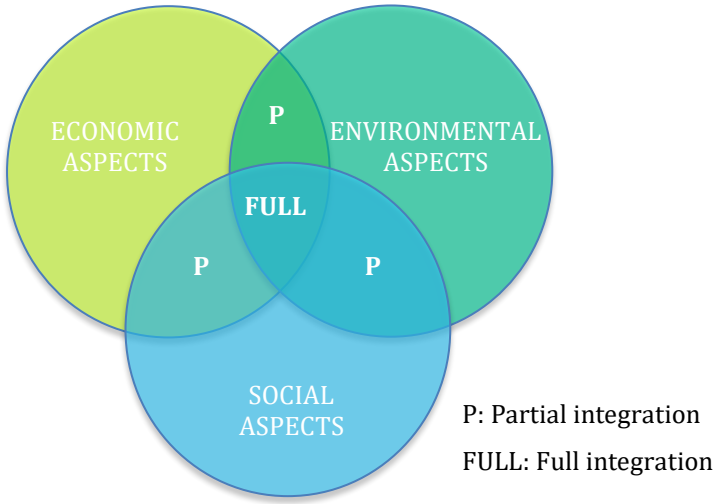

Figure 3.1 The Venn Diagram. Source: Lozano (2008).

Another model illustrating the different definitions of sustainability is the "Concentric Circles", where the environment is illustrated as the biggest circle including society with a medium circle, and economy with the smallest circle, as illustrated in Figure 3.2 below. As elaborated by Lozano (2008), the concentric circles model interpreted the natural environment as the base system for the subsystem society and consequently the sub-subsystem economy. Indirectly, it can be concluded that the concentric circles considered the natural environment as the place where society live in, and this society creates an economic system to survive. Lozano (2008) stated that the concentric circles conceive economy as the core of sustainability.

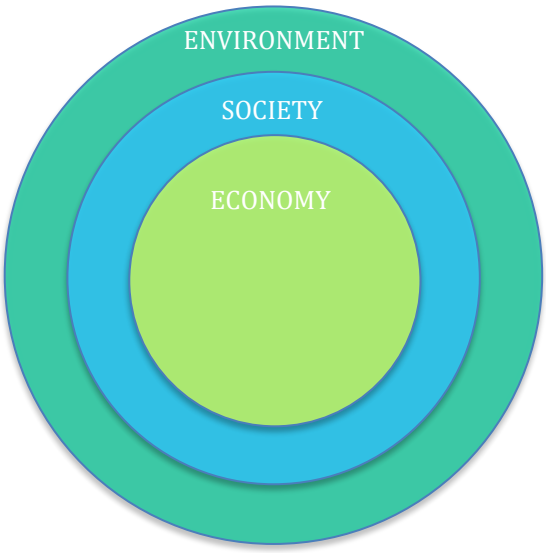

Figure 3.2 The Concentric Circles model. Source: Lozano (2008).

Another model of sustainable definition is the "Planning Hexagon", illustrated in Figure *3.3* below. According to Lozano (2008), "Planning Hexagon" is created to visualise the interrelation between economic, physical, or biological processes, individuals, cultural society, technical ability, but also legal and political system.

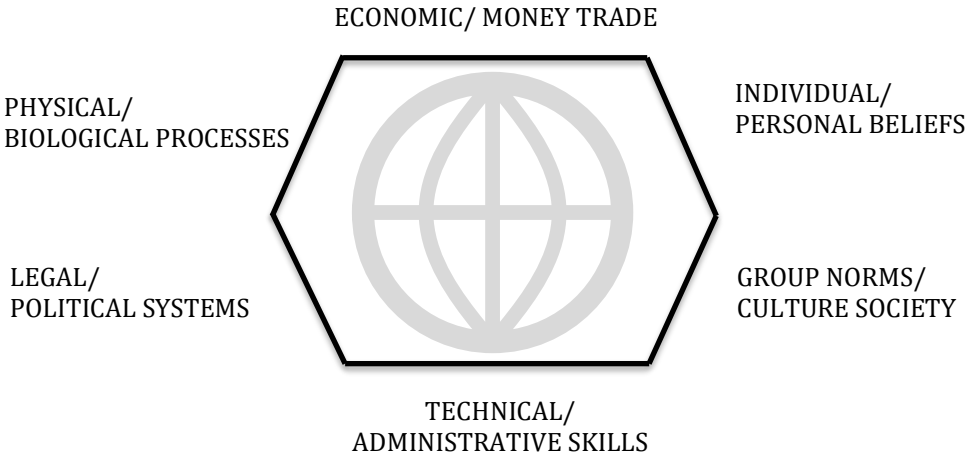

Figure 3.3 The Planning Hexagon. Source: Lozano (2008).

Lozano (2008) criticised that even though all three approaches aim to visualise the definition of sustainability in a more understandable way, they neglect the existence of scale and time dimensions and centralises them to one core. Unlike the three models

mentioned, Hedenus, et al. (2018) claimed that they present an inclusive understanding of sustainable development by elaborating on human needs, which is in line with the Brundtland's definition.

3.1.2 Thin definition vs. thick definition vs. dominant paradigms

Vos (2007) distinguished the definition of sustainability by the dominant paradigm, thin definition, and thick definition. The dominant paradigm is the widespread interpretation of sustainability that is broadly and mostly used at present. Vos (2007) clearly explained that in the dominant paradigm the natural environment is being objectified by perceiving the planet and its components merely as a place where humans can extract raw materials from. There are also thin and thick theories of how the natural environment is seen. Thin theory, as expressed by Vos (2007), considers part of nature as precious and objectifies those sources to be exploited by humanity. In comparison, when nature is seen to be worth itself and protecting it is not related to some kind of profit, it can be called thick theory (Vos, 2007).

Looking deeper into the relationship between economic, social, and environmental sustainability. There is a dominant paradigm that proposes that during the effort of achieving economic sustainability but also social sustainability, there might be damages triggered to the environment. It is believed by Vos (2007) that the economic gain to meet human needs can compensate for the environment damages. According to Vos (2007) this widespread paradigm is a result of the use of technology enhancement, which is assumed to be the main solution for sustainability (technocentric theory). While Giddings, et al. (2002) criticised the fact that often technical approaches are used as the ultimate sustainable solution and expressed their concern on the necessity of changing the human mindset on how they see the world, where nature is not merely an object and humanity is a part of both the environment and society.

Sustainability, as proposed by Vos (2007), is considered as security in terms of maintaining a special civilization and providing different options for future generations. Despite the definition described, Vos (2007) argued that the definition of sustainability should evolve by time and contexts. This argument is implicitly supported by Lozano (2008), who proposed a new way of defining sustainability. He criticised the former sustainability models and introduced a model where the concerns in economic, environmental, and social aspects would be intra-related with each other and interrelated with other aspects along the time dimensions.

3.1.3 Report Definition

The word *"sustainability"* used in this study is referring to the combination between the Venn diagram explained in Section 3.1.1 and thick definition explained in Section 3.1.2. The Venn diagram considered three aspects of sustainability which are economic, environmental, and social aspects. Further, thick definition of sustainability defined that sustainability should not objectify nature, but rather see nature as valuable for its own sake. In other words, thick definition of sustainability pushes human to genuinely care about the nature itself. Hence, sustainability in this study is the balance point where the earth's elements, consisting of nature, money, and human, intersect each other and can be gained by protecting and preserving them without having the purpose to generate benefits for human interests.

3.1.4 Drivers

The drivers that promote sustainability prove that such an approach is mainly guided by the most powerful stakeholders related to construction, according to Chang, et al. (2015). The driver with the bigger impact is the governmental policy which is affected by the local environmental and social issues that prevail in a country. This suggests that the initiatives taken by the government to address issues, hence the environmental crisis, result in direct pressure on the construction sector to adopt to the new requirements and improve their performance in the issues that sustainability addresses. Equivalently, the lack of a sustainable policy from the government might have a negative impact on sustainability.

Another driver towards sustainability, according to Chang, et al. (2015), is the influential power that the different stakeholders of a project have. Stakeholders like property developers or contractors that have a keen sense of responsibility towards sustainability have an equally strong effect on other stakeholders, for instance sub-contractors, by setting requirements that oblige the rest of the stakeholders to conform with. These requirements force the stakeholders to rethink the way that they work and become more sustainable. Such requirements may be related with certifications, using environmentally friendly materials, or even requesting reduced energy consumption for the production (Ruparathna and Hewage, 2015b).

The latter driver is also related with the fact that most companies aim to increase or improve their reputation, and usually this is achieved by adopting sustainable criteria and solutions (Chang, et al., 2015). The authors also explained that reputation is not the only gain for property developers, since they can also achieve lower prices which help them lower their cost and increase their income by selling "green" solutions at an increased value, according to the norms of the market. Renukappa, et al. (2016) also supported that a sustainable strategy may benefit businesses since they can increase their income by offering new opportunities. According to Chang, et al. (2015), governmental impact and corporate responsibility are the most crucial factors for the promotion of sustainability in the construction sector. This means that the adoption of sustainability can be increased if there is a broader understanding of the benefits gained, especially when it comes to people that define the governmental policy or are part of the top management of property developers. Walker and Philips (2009) mentioned that the direction that environmental technologies are driven is mostly dependent on the policies and the regulations that the government adopts.

3.1.5 Barriers

Regardless the clear intentions to improve sustainability (Boverket, 2020) and the efforts made in the construction sector, there are some barriers that delay this progress. Siew, et al. (2015) identified four main barriers in implementing sustainable construction. Firstly, the main issue that occurs is that there are several definitions in the literature for sustainability and its pillars, which usually are unclear and vague since they use "ambiguous words". This unclarity leads to the confusion of the different stakeholders, who can interpret them in their own way depending on their background and their scope. Consequently, lacking a standard definition, between the different stakeholders involved in the project, might have a negative effect on sustainability targets. Candel and Törnå (2021) also mentioned that there might be "conflicting objectives" because the three main pillars involve a wide variety of issues that can be prioritised differently depending on the stakeholder and their interests.

Another barrier according to Siew, et al. (2015) is that there is an inconsistency on the tools used to assess sustainability. It is highly important to be able to measure and predict the results of sustainability that are agreed. This proves to be a challenging task since the quantification of sustainability usually is inaccurate or imprecise. Moreover, it seems to be lacking widely accepted requirements in terms of scoring scales and weightings, since each stakeholder has a specific preference with which they are more familiar. All these, result to a discrepancy on comparing goals and especially between different projects. Zuo, et al. (2012) highlighted also, that especially in the social sustainability criteria, there is an adversity on measuring and assessing them.

When it comes to the human factor, Siew, et al. (2015) supported that it can become a barrier to the implementation of sustainability. This might be the result of the human resource management, which is not prone to take steps for the adaptation of sustainable behaviours among the employees who might show resistance to any change suggested. Karji, et al. (2020) also highlighted that there is a discomfort among people to change their way of working and adapting to the new challenges that sustainability brings.

Finally, Siew, et al. (2015) stressed that "the slow adoption of "green" technology" is an important barrier too. More specifically, the fact that "green" technology is not widely implemented results in the decreased advancement of it, which in sequence does not improve its cost limits. Chang, et al. (2015) also proposed that the affordability of a sustainable solution has a crucial role in the barriers of sustainability. The authors claimed that the size of the businesses is related to affordability and their ability to develop integrated design that can support sustainable solutions. In addition, the fact that there is great insecurity and knowledge about the cost of a sustainable solution is closely related to the slow adapted "green" technology. Karji, et al. (2020) also approved that the financial constraints have a negative impact. This means that costs might prove to be too high to sustain both in the short and long term (e.g. certification and maintenance costs). Candel and Törnå (2021) stressed the financial risk factor as the main barrier in the implementation of sustainability. The fact that this risk is allocated between different actors makes it harder to combat, since if sustainability is not high priority for all actors, it might have a negative effect on the cost overall. This is also explained by the fact that property developers aim for a short-term profit, after selling the property, while the end-users are those that accumulate the profit in the long-term, for instance by the reduced energy consumption.

3.1.6 Governmental Regulations

There are many governmental regulations which may affect the sustainability practices. In this section, a review of the literature of governmental regulations is presented, based on the publications of Boverket Climate Declaration (regulation within Sweden), European Commission Regulation (guidelines within European Union), United Nation Sustainable Development Goals (worldwide guidelines).

Boverket Climate Declaration

The introduction of a climate policy framework with the climate act for Sweden has been delivered by Riksdag. Based on the Ministry of the Environment (2018), the framework is formed by numerous strong-willed climate targets, one of them is that Sweden aims to have zero net emissions of greenhouse gases (GHG) released into the atmosphere by 2045, and afterwards this target is supposed to reach the negative value of emissions. In other words, Sweden aims to be the forefront leader globally in achieving the Paris Agreement targets. The Swedish government thus entrusted

Boverket to conduct between 2020-2022 an acquaintanceship of the climate declaration regulation to stakeholders in the building sector. In the effort to realise Sweden's climate goals, Riksdag has established a new Climate Act regulation which demands from the developers to conduct and hand in climate declaration calculations when constructing new buildings. This regulation came into effect on the 1st of January 2022 (Boverket, 2020).

According to Boverket (2020), the construction and real estate industry has contributed 20% in the climate impact of Sweden, and specifically around 12 million tons of CO_2 equivalents. Furthermore, from the 12 million tons of CO_2 equivalents, around 33% of them is contributed by the new building projects and the old buildings' destruction. The results from researching the different Life Cycle Assessment (LCA) of buildings show that the greatest number of domestic emissions is derived from product stage modules consisting of raw material supply, transport, and manufacturing (A1-A3) with a percentage of 44.49% and from the operational energy use module (B6) with a percentage of 39.04%. On that account, climate declaration regulation is prominent to boost the revolution towards less carbon emissions from projects, by managing the material in use at the product stage (Boverket, 2020).

Boverket, as the actor on the provision level, possesses some authorities and tasks regulated in more detailed provisions. Some of the authorities and tasks are determining the database to be used by the developer when doing LCA, while providing guidance material and assisting the planning and the future enhancement of climate declaration for buildings. The database provided by Boverket will be generic climate data for the construction industry products and the energy used, representing the circumstances in Sweden. The developer must register their climate declarations to Boverket and then to proceed to the Building Committee of the municipality to get the final clearance to construct. The flowchart of the climate declaration process is illustrated on Figure 3.4.

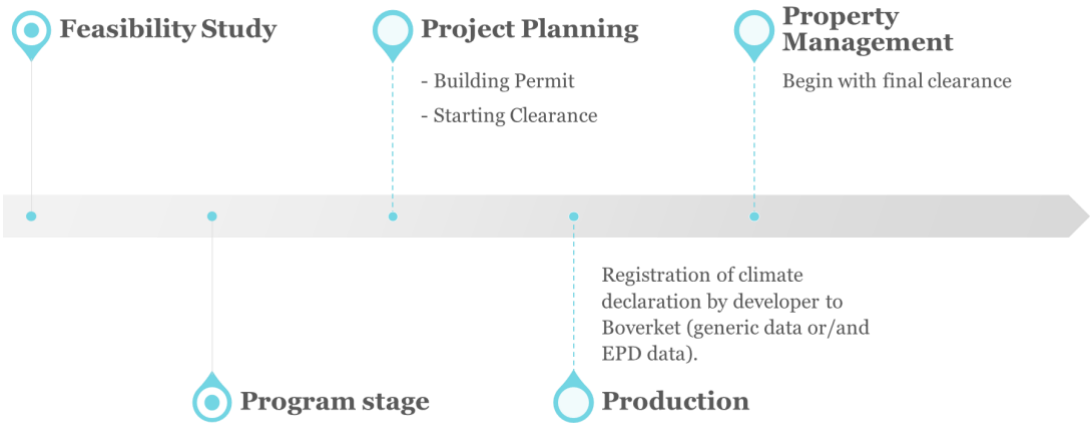

Figure 3.4 Flowchart of construction process. (Adapted from Boverket, 2020).

As for now, being effective since the 1st of January 2022, the government has filed a suggestion for developers to declare their climate impact based on production stage, until the building is fully constructed. Based on Boverket (2020), the elements suggested by the government to be calculated in the developer's climate assessments are the load-bearing structure, the building envelope, and the interior walls. In the

climate declaration, the developers ought to compile a bill of resources consisting of lists of materials, energy, and fuel use in the projects. Not merely, to calculate the climate impact, the bill of resources is optimally supposed to be in consort with the economical calculation of the project. Key indicators and experience-based value are beneficial to perform more accurate estimation of the materials required (Boverket, 2020).

Boverket also intends to add even more advanced requirements for climate declaration in the future. By 2027, Boverket hopes to demand more modules in the climate declaration including the product stage and the construction stage (A1-A5); the use stage containing modules of maintenance (B2), replacement stage (B4), operational energy use (B6); the end-of-life stage starting from the demolition, transport, waste processing, until the disposal stage (C1-C4); and finally biogenic carbon storage, net exports of locally produced electricity.

In 2027, the limit values will also be prevailed, for developers to have 20% lower emissions than a reference building. Furthermore, by 2035 and 2043, the limit values will be stricter to respectively 40% and 80% lower emission than the limit values of 2027. Figure 3.5 illustrates the timeline of the climate declaration development planned by Boverket.

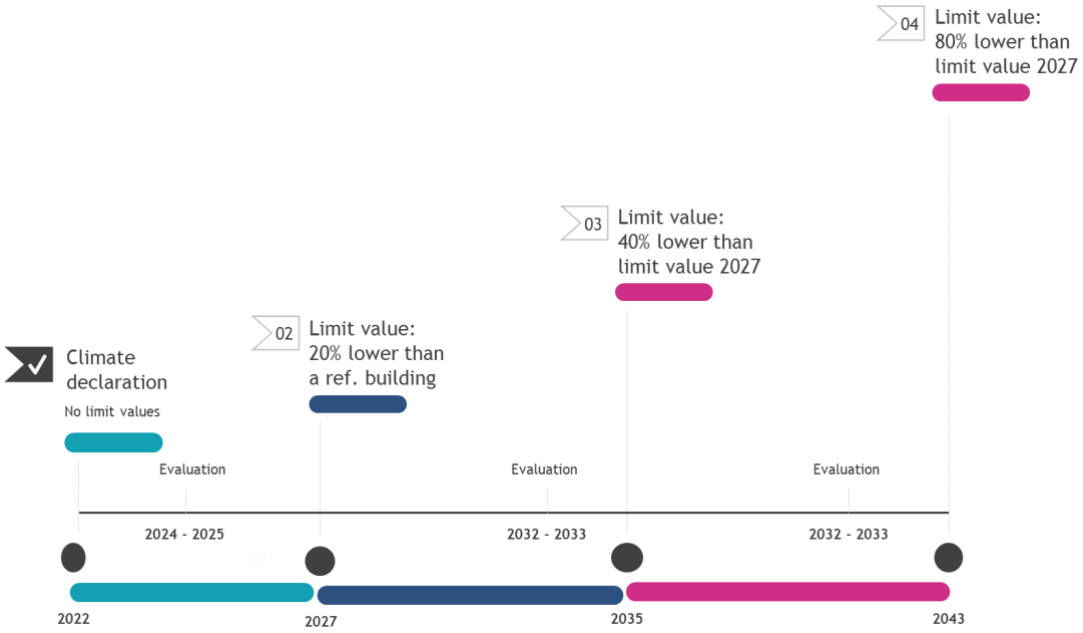

Figure 3.5 Timeline schedule for climate declaration development. Source: Boverket (2020).

The enhancement of additional modules and limit values expressed by Boverket (2020) is expected to drive a more climate-friendly decision in the design and construction phase and strive a resolution in the construction activities to have zero climate impact. Therefore, if most developers follow these regulations, the construction and real estate industry would become then less of a burden for Sweden's climate goals.

The reason behind the climate target by Sweden is not only actions for taking care of the environment and the human dimension, but also the economic dimension. Boverket (2020) mentioned there are two fundamental economic climate policy elements that

influence the construction phase, which are carbon taxes and the European Trading System (ETS) in emission rights.

European Commission Regulations

One of the driving forces of the Swedish climate goals is the European Commission agreement held in Paris in December 2015. The European Commission (2022) stated that the Paris agreement is the first legal breakthrough that has gathered all nations to agree to work together to encounter and find solutions towards the global climate change and its impacts. The fact that the global temperature has risen time by time, has driven the Paris Agreement, with its main purpose being to keep the global temperature under 2°C and commence efforts to even make the global temperature rise only 1.5°C. Not only taking care of the environmental aspect, the Paris Agreement is also aiming on the economic and social aspect by reinforcing the competence of countries in facing climate change impact and assisting each other in this process. Based on the European Commission (2022) there are several key elements deriving from the Paris Agreement, and more specifically those are:

1. Mitigation, by focusing on decreasing emissions.
2. Transparency and global stocktake, which encourage all participating parties to submit their Nationally Determined Contributions to remind and track the progress of climate actions with upholding the transparency and accountability system.
3. Adaptation, by reinforcing the competence of society to face climate change impacts and assist developing countries in the process.
4. Loss and damage, by providing knowledge to all parties on the loss and damage that climate change has caused, and also encouraging cooperation to extend the understanding of an early warning system preparation.
5. The role of cities, regions, and local authorities of developing countries to address the climate change issue.
6. Support, by providing support to the developing countries in the effort of lowering emissions and establishing the ability to survive for them.

The European Commission has committed to achieve a climate-neutral economy as a form of adherence to the Paris Agreement. The European Commission has medium-term Climate Actions which aim on the reduction of greenhouse gas emission by 2030 to be at least 55% reduced than those in 1990 (European Commission, 2022). The key targets to be achieved by 2030 are to trim 40% of the greenhouse gas emissions (with 1990 emissions as the base), to share 32% of renewable energy, and to upgrade the efficiency of energy use by 32.5%. The European Commission has also initiated a long-term plan, aiming to be climate-neutral economy with no greenhouse gas emission by 2050 (European Commission, 2022).

In the endeavour to achieve its ambitious goals, the EU proposed the European Green Deal that will promote the urge for renovation and decarbonisation of buildings. The Commissioner for Energy in the EU Commission, Kadri Simson, in the press release of the European Commission (2019) highlighted those buildings are becoming the major contributor to energy consumption with 40% energy usage and thus emit 36% of total greenhouse gas emissions. This result is caused by the fact that all over EU there is a huge amount of non-energy efficient buildings that are still depending on fossil fuels. Simson elaborated in the European Commission (2019) that old and least-energy efficient buildings are spending more energy than the newly renovated buildings and are usually occupied by the vulnerable community that finds it hard to pay the energy

usage bills. Therefore, the EU proposed a renovation wave focusing on tackling energy poverty and least-energy efficient buildings, public buildings, and social infrastructure, while decarbonising heating and cooling systems. The target is by 2030 all new buildings must be net-zero emission, gradually removing fossil fuels in heating and cooling systems until 2040, and by 2050 embody the zero-emission buildings in a national building stock (European Commission, 2019).

It could be argued that the concern of the EU, sees merely the emission and energy aspect, but in fact it is also about the health and wellbeing of the people living in the buildings, since climate change affects the indoor quality and thermal conditions of the buildings. The EU proposed directives to improve the energy efficiency and evolve policies to incite the buildings' renovation. Furthermore, the EU provides financial assistance and supports research programmes to achieve high resilience of community through the New European Bauhaus.

United Nation Sustainable Development Goals

In 2012, a set of 17 Sustainable Development Goals (SDGs) was established as an outcome of the Conference of United Nations that took place in Rio de Janeiro (United Nations Development Programme, n.d.). The aim of the SDGs is to cover the absence of global and unified goals in handling such urgency in environmental, social, and economic aspects of catastrophes happening in the world. Around 12 years before SDGs were surfaced, the United Nations (UN) had composed the Millennium Development Goals (MDGs), which aimed to tackle poverty issues, along with its sequenced effects, such as dangerous diseases and poor education (Johnzon, et al., 2021). After 2012, the MDGs have been replaced with the SDGs. The SDGs are aiming towards the sustainability direction that provides an adequate world for the future generations. All 17 SDGs are interconnected between each other where one SDG's success will affect the other SDGs.

A follow-up agenda has been conducted during the gathering of UN's Member States in September 2015 in New York, where Sweden participated. The output of the discussion is the 2030 Agenda for Sustainable Development to achieve sustainability by 2030 (Selhag, 2016). According to Johnzon, et al. (2021), the most often SDGs mentioned and related to the real estate sector are SDG 11 regarding *Sustainable Cities and Communities*, SDG 12 about *Responsible Consumption and Production*, SDG13 about *Climate Actions*, and SDG 8 about *Decent Work and Economic Growth*.

3.2 Circular Economy

Circular economy based on the European Commission (2015) is the value possessed by products, materials, and resources that should be optimally utilised to an extended period to achieve the decrement of waste produced.

Circular economy in the procurement of construction projects may be interpreted differently, depending by the focus of the actors. There are several different interpretations of how circular economy can be implemented in the procurement process. Van Geet (2014) believed that circular procurement accentuates the execution of reusing, recycling, repairing, refurbishing, remanufacturing, and retrieving. NewForesight (2014) expressed that circular economy should be uphold in the process of purchasing, by considering the products or services which deliver the ability to be reused or to be fully composted and thus have no negative side effect and zero waste production, while the energy sources should come from renewable resources.

The application of circular economy, as requirements in the procurement process, is facing several predicaments, as argued by Kjerulf and Haugbølle (2021). The fact that contractor firms' employees are unexperienced to perform waste management, certification schemes, and material testing, as argued by Kjerulf and Haugbølle (2021), may cause a difficulty to keep up with the requirements written in the procurement.

The study of Sterner (2002) claimed that many demolished buildings have an immense potential to be reused and recovered. Moreover, the author found that the majority of Swedish contractors have implemented the separation of waste and the choice of green materials in the market. However, in order for the contractors to apply reusing practices, they need an approval by the clients and need to prove that the reusage of materials will be successful. Therefore, Sterner (2002) believed that the consideration of waste handling and circular economy practice should be taken place in the planning and designing phases, or commonly known as design for deconstruction.

3.3 Sustainable Procurement

It is clear from the drivers of sustainability that the property developers are the stakeholders with the most influential power towards other stakeholders, thus being the stakeholders that can promote sustainability in a broader spectrum, which is also supported by Yan, et al. (2015). Ruparathna and Hewage (2015b) agreed with this and stressed the need for property developers to gain experience in the field of sustainable procurement to achieve effectively better results. Sustainable procurement appears to be their most valuable tool (Ruparathna and Hewage, 2015a) and according to Walker and Philips (2009) the main purpose is to increase the value of a project through its whole lifetime cycle. Sustainable procurement's importance is supported by the need to combat traditional procurement methods, which are criticised for being ignorant of the effect that the projects have for the environment, the society, and its financial health (Yan, et al., 2015). Sustainable procurement raises the necessary criteria to achieve the goals of sustainable development, by also changing the policies that promote it. Such policies might be framed by international standards, for instance ISO 26000, that promote the implementation of sustainable procurement (Iles and Ryall, 2016). Andrecka and Mitkidis (2017) highlighted that sustainable procurement does not facilitate the promotion of the environmental, social, and financial sustainability agenda, but is related also with the promotion of innovation.

From the scientific literature it occurs that the bibliography concerning the private sustainable procurement in the construction sector is limited and a structured definition has not been framed. Several global organisations have constructed general definitions on sustainable procurement, which could prove useful setting the principles under which private sustainable procurement of construction projects is based. More specifically, the United Nations Development Programme defines Sustainable Procurement as:

> *"…making sure that the products and services we buy are as sustainable as possible, with the lowest environmental impact and most positive social results."*
>
> (United Nations Development Programme, n.d.).

The European Union (EU) respectively defines Sustainable Public Procurement as:

> *"…a process by which public authorities seek to achieve the appropriate balance between the three pillars of sustainable development - economic,*

social and environmental - when procuring goods, services or works at all stages of the project."

(European Commission, n.d.).

The United Kingdom government has tackled this issue and more specifically by establishing the Sustainable Procurement Task Force in 2006, which defined sustainable procurement as:

"…a process whereby organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organisation, but also to society and the economy, whilst minimising damage to the environment."

(Sustainable Procurement Task Force, 2006).

According to the Oxford English Dictionary Online (2022), the word requirement is defined as "something called for or demanded; a condition which must be complied with" and the word criterion is defined as "a test, principle, rule, canon, or standard, by which anything is judged or estimated". Therefore, for this study the word *requirement*s alludes to a set of demands that the contractors have to compulsorily meet to be able to participate in the procurement phase. On the contrary, the term *criteria* used in this study refers to the way and the principle the property developers establish those requirements, thus relating to a wider perspective that decisions are taken.

3.3.1 Environmental Criteria

A holistic approach of requirements creation in the procurement process must address the three pillars of sustainability, as Yan, et al. (2015) emphasized. Renukappa, et al. (2016) explained this holistic approach as requirements that their perspective focuses on "technical, structural, social-cultural and human resources" and a balance must be established between them. Nevertheless, as analysed in Section 3.3.5, it seems that most of the requirements focus mainly on environmental attributes that can be more "tangible" (Walker and Philips, 2009), since there are more tools to execute the measurement procedures, which are also accepted universally (Ruparathna and Hewage, 2015b).

Certification

The environmental tangibility of requirements is reflected by the fact that there are different certifications (e.g. LEED certification being the most internationally used) in procurements, which seem to provide an objective categorisation (Ruparathna and Hewage, 2015b). The study by Cole and Valdebenito (2013) categorises different countries based on the existence of domestic certification systems and usage of international certifications such as BREEAM and LEED. Sweden owns a national certification system, but instead many developers tend to apply international certification systems, as proposed by Cole and Valdebenito (2013). However, this statement is contradicted with the data provided by SGBC (2022), where in Sweden the majority of buildings are using national certification, Miljöbyggnad, and more specifically 2176 number of buildings. SGBC (2022) denoted that BREEAM and LEED-certified buildings in Sweden are only 119 and 306 respectively.

Todd (2012) further elaborated that BREEAM SE in the period 2008 to 2011 conducted an investigation about the chemical substance level in 1500 various construction materials. Sweden Green Building Council (SGBC) first conducted an adaptation for BREEAM to suit the Swedish circumstances in 2013 and then updated by time until the

current version BREEAM-SE 2017 (SGBC, 2018). Todd (2012) stated that in contrast with BREEAM SE, which focuses mainly on chemicals, LEED certification instead prioritises more circular economy aspects by suggesting the recycling opportunity as a form of managing waste. Moreover, Sezer and Fredriksson (2021) complemented that BREEAM SE proposes for the materials' impact to only cogitate the data gathering of the delivery of materials and waste, while LEED allows further expanse for the development of decreasing the transportation of material in order to make the least disruption to the people surrounding.

Eriksen, et al. (2017) appended that in the Swedish context LEED certification is preferred, since it assists in the best-value evaluation. The authors also suggested that other environmental requirements in LEED are embodied in the energy consumption standards for both the construction and operation phase, environmentally friendly materials or even handling materials after their lifecycle and their recycling, which is also supported as the most common requirements by Yan, et al. (2015). It is also common to request to comply with the local regulations and guidelines in case there any particularities. Less commonly requested criteria are, according to Ruparathna and Hewage (2015b), incentives that affect the well-being of the surrounding area or even requests to improve it, while assessing the impact that the project has on it. The comparison of BREEAM, LEED and Miljöbyggnad is shown on Table 3.1.

Table 3.1 Detail information of three certifications (adapted from Aulin and Elland, 2013; Nguyen and Altan, 2011; Rohanimehr, 2015).

	BREEAM-SE	LEED	Miljöbyggnad
Methodology	Score-based assessment, and building is rated by the total score.	Score-based assessment, and building is rated by the total score.	Specific rating assessment, gradual rating system from room level to indicator level, indicator level to aspect level, aspect level to area level, area level to building level.
Version	BREEAM-SE 2017	LEED v4.1 New Construction	Miljöbyggnad 3.2 New building
Criteria	Energy 19% Health & well-being 15% Land use 10% Materials 12.5% Management 12% Pollution 10% Transport 8% Waste 7.5% Water 6% Innovation (bonus) 10%	Integrative process 1p Location & transportation 16p Sustainable sites 10p Water efficiency 11p Energy and Atmosphere 33p Materials and resources 13p Indoor environmental quality 16p Innovation (bonus) 6p	Energy Indoor climate Material & chemical substance Special environmental requirement

		Regional priority (bonus) 4p	
Level	Outstanding ≥ 85% Excellent ≥ 70% Very Good ≥ 55% Good ≥ 45% Pass ≥ 30% Unclassified < 30%	Platinum ≥ 80p Gold 60-79p Silver 50-59p Certified 40-49p	Bronze Silver Gold

BREEAM SE and LEED are known to rate the building based on points achieved, this method is criticized by Turk, et al. (2018) because both have many criteria, which are weighted disproportionately, hence stimulating the misuse of the system by achieving many small points from the easy criteria to outgrow the low score in complex criteria.

Unlike BREEAM and LEED, Miljöbyggnad as featured by Ramírez-Villegas, Eriksson and Olofsson (2016) opt for using a gradual rating assessment system by allowing different criteria to influence the overall rating of the building and consequently push out the points chasing behaviour. Miljöbyggnad also tries to maintain the cost of implementation as well as giving equal weight on every element in all criteria (Ramírez-Villegas, Eriksson and Olofsson, 2016).

Life Cycle Assessment (LCA)

Renukappa, et al. (2016) mentioned reduction of carbon dioxide emissions targets as a common criterion in contracts, which affects also other stakeholders involved. The same framework is also supported as a practice in the private sector of United Kingdom by Iles and Ryall (2016). Bonenberg (2017) highlighted that the European standards developed for the environmental performance of the project might also be requested, which cover the criteria mentioned by the previous authors but also quantify the targets in lifecycle analysis by demanding LCA calculations, while Eriksen, et al. (2017) mentioned that methods like LCA may be not yet easily accessible and not preferred in broader spectrum.

Starting on 1st of January 2022, Boverket has officially regulated a new climate declaration regulation for new buildings, which must be submitted by property developers. The sustainable criteria implementation in the construction industry is still in a development process. One factor could be the lack of standardisation on the methods and tools. Kjerulf and Haugbølle (2021) expressed that there is a necessity for new standardisation practices since their inadequacy will encounter the property clients' adeptness to the precision and clarity of the sustainability requirements in the procurement. This argument is also supported by Sterner (2002), where the development of instruments (e.g., LCA) used for assessing the environmental impact of building materials and their assembly is crucial. The contractors may also experience a severity on the cost estimations and time scheduling (Kjerulf and Haugbølle, 2021).

In practice, the severe uncertainties in the assessment methods such as Life Cycle Costing (LCC) and Life Cycle Assessment (LCA) are highlighted by Kjerulf and Haugbølle (2021) and Sterner (2002), and those uncertainties amplify the advancement of cost calculation which cause more error possibilities. According to Sterner (2002), LCA emergence is a legitimate tool to review the environmental impact experience issues regarding the completeness of database and the intricacy of analysis. In other words, the validity and credibility of LCA analysis is questionable.

Circular Economy

The requirements towards waste handling, recycling, and reusing, mentioned by Ruparathna and Hewage (2015b), might be covered by circular economy targets, which are perceived, as stated by Adams, et al. (2017), as a concept of practices which aim to extend the material productivity, minimise waste, preserve the materials' value and bring through the closed loop systems for materials and energy consumption. There is a lot of research regarding circular economy, however, Kjerulf and Haugbølle (2021) highlighted that most of the circular business models are product-oriented which focus on the products itself such as recycled products, reusable products, long-lasted products. This perspective needs to change, as argued by Kjerulf and Haugbølle (2021), since circular economy perspective needs an adaptation for the construction industry by considering long-term decisions, such as longer life cycle of capital goods, higher degree of flexible building design, procurement of specific product, and maintenance services over the building lifetime.

Energy Consumption

The data delivered by European Commission (2019) showed that the building sector consumed 40% of the energy consumption in Europe. From this point, the European Commission formulated energy savings and nearly zero-energy building agendas as written under Section 3.1.6. All being the case, it is believed by Lazoroska and Palm (2019) that the property industry is stimulated to decrease the energy usage and to build energy-efficient buildings.

Correspondingly, Kanters, et al. (2013) enlightened that to have nearly zero-energy buildings, it is substantial for the buildings not only being efficient in the energy consumption, but also produce energy by having solar-integrated panels. Further, Kanters, et al. (2013) described that the solar energy can be obtained passively through passive heating and daylighting or actively through solar panels and solar cells installation (photovoltaic).

There is a large census of certification demand, hence BREEAM, LEED, Green Building Standard, Passive House Certificate or Building Programme South (Swedish program). This was interpreted by Kanters, et al. (2013) as a means for the clients to present the sustainable impression among the market. For instance, the clients exhibit the solar panels and cells in the most exposed location, even if it is placed on an inefficient energy location. Aqel (2021) explained that Swedish government subsidies on the solar panels and the percentage of subsidy always changes yearly. This subsidy is perceived as an aid to break the stereotype of solar panels being expensive. The proof is stated by Ahrberg (2021), where the costs for installing solar panels decreased by 80% for the past 7 years.

Dahlquist, et al. (2015) elaborated that the regulation in Sweden, particularly from the Swedish Tax Agency point of view, regulated that if a property installs a free-standing photovoltaic, it will be incorporated with the property. The author explained that the Swedish Tax Agency appraise photovoltaic installation as a tool to make cutbacks in electricity costs from the operations of the property. The Swedish Tax Agency also suffered challenges to follow the pace of frequently policy changes for renewable energy. In the bargain, solar power compared to the wind power gets less attention by the Swedish regulations on the renewable energy market (Dahlquist, et al., 2015).

Bulut (2015) presented the data from the Swedish Energy Agency, where district heating is extensively used for multi-dwelling and non-residential buildings, whereas

electric heating is famous among one/two-dwelling buildings. The electric heating is coming from the heat pumps which the growth reaching 1.1 million products in 2013 (Bulut, 2015). The district heating system of payment is controlled by a monopoly, and if customers buy electricity from other retailers, the payment has to come through the local monopoly. Bulut (2015) criticised the district heating monopoly for bringing up several issues, such as lack of competition in the district heating networks, generating mistrust between the building and energy industry, for being a less transparent system. Further, the Sweden's national buildings' policy is sectarian as the regulation promotes the heat pumps use to replace district heating.

Moreover, Bulut's (2015) findings showed that self-generated electricity, by inserting small-scale photovoltaic or wind systems, became a subject of debate because on the one side property developers are worried of uncertainties in energy price, and on the other side they are motivated to be independent from energy companies, which might also decrease revenues for energy companies.

3.3.2 Social Criteria

The social criteria articles are also not as many as those for the environmental aspects, while the social criteria are also considered as the easily neglected criteria. The most common social indicator requested in the procurement is safety measures for the well-being of the employees (Ruparathna and Hewage, 2015b), while payment plans or wage policies are less commonly discussed (Yan, et al., 2015). Renukappa, et al. (2016) claimed that clients with consideration to social criteria, tend to promote sustainable procurement that cover issues related to working conditions, discrimination, safety, working hours and compensations, which are usually framed by the standards of ISO 14001 certification if available.

Ethical trading might also apply in this context since the contractors are not the only stakeholder of the project. It was highlighted that some clients set requirements that not only affect the contractors, but also request from them to set requirements and perform checks to the suppliers they use or even request their suppliers to be certified (Walker and Philips, 2009). This means that the contractors are called to collaborate with suppliers that comply to social criteria, hence respect working rights and provide good working conditions, while simultaneously deliver services that fulfil the environmental criteria, hence green transportation of the supplies (Andrecka and Mitkidis, 2017; Walker and Philips, 2009). This illustrates how the clients can trigger a chain reaction of setting sustainability requirements and affect other stakeholders in a broader spectrum.

Employment opportunities is an emerging issue of social sustainability and sustainable procurement should provide incentives to support this issue. Andrecka and Mitkidis (2017) laid emphasis on how clients can set specific requirements that suggest involvement of local workers, to combat unemployment in the area, or even demand contractual agreements with workers, therefore setting better conditions for them. Nevertheless, Ruparathna and Hewage (2015b) claimed that this phenomenon is rare and usually the clients are restricted to only requesting contractors to comply the local regulations or even assume that they are obliged by law to follow them.

3.3.3 Economic Criteria

Bonenberg (2017) mentioned that BIM models might be requested as an attribute of the project that may assist not only in the enhancement of the performance of the production phase but may also provide incentives that can add value on the project

during its operation phase. The BIM models offer conflicts' inspection and quality checks that can reduce expenditures from discrepancies that will occur during the construction phase. They may also assist in more efficient calculations, when it comes to sustainability targets, hence perform better LCA analysis or energy performance tests, while defining design objectives that cannot be specified in another context. Yan, et al. (2015) proposed that the technology level used in the project for the production and management should be clearly defined in the contract. Other advanced technologies or equipment are less frequent because of the uncertainty that characterises them in terms of cost and productivity. Nevertheless, Andrecka and Mitkidis (2017) explained the importance of setting criteria and procuring in a way that will still leave some kind of freedom to the contractors, in order to apply new innovative techniques and procedures without risking the success of the project or their financial viability, while Ruparathna and Hewage (2015b) stated that innovative solutions are always welcomed by the clients although they are not requested.

Quality assurance is an important criterion, according to Yan, et al. (2015), however it is not always included in the procurement documents by every client. On the contrary, Bonenberg (2017) proposed that some clients may set requirements that request to perform checks to assess the success rate of the requirements that were set during the design phase related to the final outcome. In addition, the author suggested that some requirements might involve management responsibilities related to achieving complete results, in a correct way and achieving credibility. Ruparathna and Hewage (2015a) mentioned that even the timely delivery of the project might be a criterion in the procurement since this affects the sustainability targets set during the designing of the project, addressing mainly issues related to the social and economic perspectives.

3.3.4 Incentives

Moral Obligation & Reputation

The incentives that are related with sustainable procurement follow the drivers of producing more sustainable projects and the benefits gained from sustainability, which they consider as moral obligation (Iles and Ryall, 2016). Walker and Philips (2009) also highlighted this imperative need for businesses to act ethically, thus the existence of socio-economic pressures lead them to promote sustainability in practice through the procurement, especially increasing the focus to the social and economic objectives, since the environmental objectives are those profoundly addressed. This is usually reflected in the corporate image of the organisation. Sustainable procurement is an essential tool to promote sustainable solutions and achieve the goals set for the performance of the projects, while improving the corporate image by affecting positively their reputation (Iles and Ryall, 2016; Renukappa, et al., 2016). In other words, it assists promoting the company's corporate social responsibility (CSR), which has become an important part of the management of competitive businesses. Walker and Philips (2009) also claimed that implementing sustainability is related to innovation, which has also a strong effect on the reputation of the organisation. Except the reputation benefit the company achieves, the organisation manages to keep up with the competitiveness of the market, either because sustainable criteria become a widespread practice in the industry or because they pursue to keep their position in the sector as pioneers (Ruparathna and Hewage, 2015b). On the other hand, negative reputation might push companies to adopt sustainable criteria, since they feel pressure from the market but also from the societal impact that will follow in case, they fail to

perform what is considered expected and obligation, leading to negative publicity (Andrecka and Mitkidis, 2017).

Governmental Regulations

Governmental initiative is considered the most important driver towards sustainable procurement by most of the authors. Renukappa, et al. (2016) and Ruparathna and Hewage (2015b) mentioned that most of the organisations implemented sustainable procurement in order to be able to respond to the governmental regulations set for sustainability or even being able to cope with forthcoming legislation according to Ruparathna and Hewage (2015a). Iles and Ryall (2016) also highlighted the importance of the government in promoting the sustainability agenda, while their role is not limited only in legislating but also in providing guidance to companies on how to adopt these practices or discussing with them on how to develop the legislation.

Cost Savings

By setting the right requirements and implementing the proper environmental standards, according to Walker and Philips (2009), they can achieve improved results in the quality, value, and cost of a particular project. Although there are arguments that developing sufficiently sustainable procurement might prove to be costly (Iles and Ryall, 2009), the long-term savings are one of the most important drivers to overcome this problem (Ruparathna and Hewage, 2015a) and even reduce the cost sometimes (Iles and Ryall, 2016). Renukappa, et al. (2016) explained this benefit is gained in an indirect way since it assists the organisations to gain a competitive advantage in the industry and initiate the introduction of innovative proposals and technologies, while having a positive effect in the cost.

Sustainable Procurement Manual

Ruparathna and Hewage (2015b) mentioned that the top management's ambition to apply structured procedures in order to have a standard level of quality may help improve reaching the sustainability targets, when those clear intentions towards sustainability are reflected in the procurement manuals that are developed in the company. Yan, et al. (2015) also proposed that sustainable procurement is an initiative that comes from the top management and addresses the whole performance of the project. Iles and Ryall (2016) mentioned that the top management does not only achieve to promote sustainability attributes inside their projects, but also motivates their stakeholders and suppliers to adopt such mindset to be able to encounter with the demands set, which is more easily communicated when there is a clear structure.

Internal Structures

Renukappa, et al. (2016) highlighted that reward systems and training programmes could become a useful asset that would increase the implementation of sustainable procurement, but however they remain limited in use. Nevertheless, organisations that steer for innovation and change implementation, appear to use planning and rearranging of their structure in a way that facilitates the promotion of sustainable procurement.

Workforce Implementation

Ruparathna and Hewage (2015a) mentioned that the organisations acknowledge the benefits from social sustainability, thus they try to implement practices through sustainable procurement that would promote social incentives. The benefits for the organisation might be that they improve their workforce, while achieving better results

and assisting the society. However, the benefits are not limited to this since the social impact they have leads to a positive effect for their reputation.

3.3.5 Challenges

Property Developers' Initiatives

Ruparathna and Hewage (2015a) highlighted that sustainable procurement in the private sector is highly depended on the willingness and the initiative of the property developer to apply it. The authors also mentioned that it can be related with the lack of sufficient inner policies and regulations that would push the organisations to adopt widely those practices, and leadership has a vital role in this process. Nevertheless, it is equally important to educate the public, so that the customers become aware of the importance of sustainable solutions and how the cost is associated with benefits in a long-term perspective, so that the property developers get motivation by an increased demand to promote more sustainable requirements in the procurement (Walker and Philips, 2009). Likewise, Candel and Törnå (2021) proposed that property developers tend to promote solutions that are perceived highly valuable by the end users.

Another important aspect, according to Eriksen, et al. (2017), is the fact that most of the procurements set requirements only for the design and construction phase, disregarding the operation and end-of-life phase. The authors stressed that there is need for a broader consideration of the projects' lifecycle, in order to successfully reach the sustainability targets, set for the project. In the first case, the property developers shift the responsibility to the owner of the building to handle all materials after the end of its use. This does not push the property developers to ensure that the practices they choose will remain sustainable also for the demolition phase of the project. This why the authors explained that it depends on the interest of the property developers to apply sustainability and sustainability criteria.

Cost and Funding

The most prominent issue is that organisations struggle to finance more sustainable solutions, since this requires more funding in the beginning or has a greater capital cost, which can benefit the organisation in a long-term spectrum (Ruparathna and Hewage, 2015a). They also mentioned that a shift to sustainable procurement requires investments, so that tools, frameworks, and structures are developed inside the organisation to support sustainable procurement. Thus, it seems difficult for small and medium companies to adjust to this demand and consequently those companies usually aim to short-term interest, while having limited opportunities on tender assessment (Ruparathna and Hewage, 2015b). Iles and Ryall (2016) also stressed the negative effect that cost has to the implementation of sustainable procurement strategies and highlighted that local companies struggle to cover that cost. This has a negative impact for those local companies since it affects their corporate relationships and excludes them from future projects, because they cannot adopt sustainable practices.

According to Candel and Törnå (2021), the most important barrier of the cost is the conflicting objectives that property developers have with those of the sustainable construction. The fact that property developers usually aim for a short-term profit, while trying to be competitive is translated to delivering attractive solutions at the lowest price. This perspective disregards future benefits of the project and separates the capital from the operational cost, thus leading to cost minimisation targets.

Measurement Issues

Walker and Philips (2009) highlighted that the challenge that clients have to face is the measurement issues, since it is important to quantify the results and the performance of a project to assess the effectiveness of the criteria. It appears that organisations have shifted towards this direction the last decade by focusing more on reporting their environmental, social, and financial performance. More specifically, even when indicators can be quantified, the results may vary depending on the assumptions made and how the project's lifecycle is considered. Such issues in measurement might appear in waste calculation, energy efficiency, transportation and emissions, health, and sustainable supply structures (Walker and Philips, 2009). Ruparathna and Hewage (2015b) mentioned that the clients choose to communicate sustainable criteria mainly with leadership in energy and environmental design (LEED), while social sustainability initiatives are usually omitted from the procurement phase according to the authors. Eriksen, et al. (2017) explained that the underlying reason is that social sustainability is challenging to measure, since it is a subjective term that is hard to quantify. But quantifying and assessing the technical aspects of sustainability is the biggest challenge in the procurement.

Simultaneously, the issue of measurement may also negatively affect the evaluation of project tenders, especially because there is no unified method to assess all these criteria and prioritise the offers, mainly in the social and environmental factors (Ruparathna and Hewage, 2015a). It is also highlighted that usually tenders are assessed based on the lowest cost and not the one that will achieve the best value or the one that takes into consideration the whole lifecycle cost (Ruparathna and Hewage, 2015b). Yan, et al. (2015) also mentioned that lowest tendering price is the most frequent practice, hence the main obstacle towards more sustainable driven procurement. This derives from the fact that usually the sustainable projects have a higher cost in comparison with the conventional ones. According to Ruparathna and Hewage (2015b), this is also an issue that occurs due to the lack of tools and policies, and it is essential that objective criteria and standard methods are developed to combat the traditional procurement methods.

Lack of Knowledge

Mainly, the hesitation towards sustainable procurement derives from the lack of understanding and knowledge towards sustainability and its three pillars, and when this originates from the clients, sustainability targets are risked (Ruparathna and Hewage, 2015a). Iles and Ryall (2016) mentioned that although the cost for sustainable procurement strategies is high, lack of knowledge is the essential factor why sustainable procurement is considered a burden for many companies.

There is an essential issue when it comes to the full understanding of all pillars of sustainability and especially addressing them in the project design. According to Walker and Philips (2009), environmental criteria are considered more "tangible", which means that organisations can quantify them easier than attributes from the other pillars, which is also supported by Ruparathna and Hewage (2015b). The authors also stressed the necessity for the governments to regulate accordingly, since they mainly focus on the environmental issues too. Eriksen, et al. (2017) suggested that sustainable procurement primarily focus on criteria that have to do with the environmental aspects (e.g. LEED certification) and usually are those that have higher priority in the decision-making. However, this issue is related with the lack of experience in sustainable procurement and a difficulty of the responsible actors to evaluate the offered solutions. The authors also suggested that the lack of knowledge is related not only with evaluating solutions but also assessing technical methods used, since most of them are emerging the last years and the industry is not familiar with them.

Qualified Personnel

Bonenberg (2017) highlighted the importance of knowledge for the implementation of sustainable criteria, however they mentioned that it is a process that requires experienced personnel that can provide advanced knowledge in defining and adjusting sustainable requirements in the procurement phase. Renukappa, et al. (2016) also proposed that sustainable procurement requires new roles and offers new job positions in order to adopt sustainable requirements successfully and competitively, which can be a challenging process, especially when change resistance is prominent in some contexts or the funding does not allow it.

Inconsistent Policies and Regulations

Walker and Philips (2009) highlighted that the government might also negatively affect the adoption of sustainable requirements, when the sustainability agenda is vague and disorients companies from adopting the right and effective practices. This means that if the regulation is poor or there are inconsistencies in the policies suggested, then companies might be unmotivated to adopt such practices or even if they have the intentions, feel that their capabilities are limited. Nonetheless, this statement might describe the situation during the period that the article was written and nowadays the knowledge on sustainability has increased, and there are more tools to provide better legislation that can assist organisations.

Another issue that affects the successful implementation of sustainable design is the fact that designers are not familiar with the local circumstances, thus negatively affecting the sustainability targets (Ruparathna and Hewage, 2015a). Candel and Törnå (2021) mentioned that in the Swedish context, land allocation might be linked with a set of requirements set by the municipalities, that the developers are called to meet when building a project. Thus, they might be led to negative impacts on the implementation of sustainable solutions, especially if those requirements are communicated in a wrong way. Eriksen, et al. (2017) proposed that the regulation might be restrictive on many occasions, but companies have to deal with more difficulties in adopting sustainable solutions for existing buildings, where the legislation is even more vague.

Reluctance to Change

Andrecka and Mitkidis (2017) mentioned that the implementation of sustainable procurement is related with the flexibility of companies to adjust to change and the reluctance that is cultivated in their structures. When they lack policies or ambition to change, sustainability transition is delayed. This resistance, according to Candel and Törnå (2021), is strictly related with the fact that the construction sector is considered conservative and innovation as risky or non-profitable.

Uncertainty

The criteria are defined in an early stage where the uncertainty levels are high, and contractors are called to make binding decisions that might have a negative effect on their company's financial operation, if they fail to meet (Bonenberg, 2017). Candel and Törnå (2021) explained that the important levels of uncertainty usually lead to changes in the future, since predicting for long-term benefits might have different results in reality, which creates the dilemma of who is liable to cover the expenses that may occur.

Sharing of Knowledge

Setting criteria towards sustainability means that all related parties have to share information about their practices to ensure that they meet those criteria. However, this might prove to be a challenging task, since usually there are confidentiality or patenting issues that arise, and are overly complex to overcome (Renukappa, et al., 2016).

3.3.6 Communication of the Criteria

Bonenberg (2017) highlighted the effect that experience personnel may have on the developing of the requirements, since their knowledge can help avoid common mistakes, assist in the better and more complete formulation of the requirements, and predict issues that could arise in the future. These requirements, according to the authors, can be divided into two categories, the prescriptive character: and the parametric character. The prescriptive character requirements aim to set specific sizes, numbers, details on the solutions (e.g. materials). The parametric character requirements propose functional or use parameters, thus allowing more freedom to apply methods that could be more efficient or those that the stakeholders have more experience on. Andrecka and Mitkidis (2017) also proposed this dipole in the requirements setting, mentioning that the clients have the possibility to be extremely specific on quantities or describe explicit performance to be achieved or obligations to be followed.

3.4 Type of Contract

The contract in the construction industry relies on a number of factors. Unlike the manufacturing industry, according to Adriaanse (2016), contracts on construction projects are influenced by the duration, the complexity, the size, the deal price, and the variety of works which adapt depending on the conditions when the project is running. According to Osipova (2008), there are two types of contracts widely used all over Sweden, design-bid-build, and design-build contracts. Lately, partnering has become more common in Sweden.

The design-bid-build (DBB) contract, also known as traditional contract, was defined by Murdoch and Hughes (2008) as the general contract on which the client separates the parties that are responsible for the design and construction stages. More specifically, the client hires consultants for the design phase and contractors for the construction phase.

Borg (2010) mentioned that the design-build (DB) contract is used when a general contractor is hired to have the overall responsibility of the project, encompassing the design and construction. As argued by Osipova (2008), the design-build contract is valued as the most forthright contract considering the responsibility point of view, because clients merely have single contract and set their requirements for the whole delivery process of projects. Moreover, Kadefors (2004) mentioned the design-build contract also known as turnkey contract or *'totalentreprenad'*, is frequently used in Sweden and Nordic countries.

Based on the documents composed and published by the Building Contracts Committee (BKK) in Sweden, basically there are two types of documents which should be used in certain circumstances. More specifically, as Osipova (2008) explained, the documents called "General Conditions of Contract for Building, Civil Engineering and Installation Work" (AB04) are used to assign the tasks and answerability for every party involved in the design-bid-build (DBB) contract. Comparatively, Osipova (2008) elaborated that the design-build (DB) contract's obligations are written in the "General Conditions of

Contract for Building, Civil Engineering and Installation Work performed on a package deal basis" (ABT06).

3.5 Tender Evaluation

Yan, et al. (2015) stressed the fact that sustainable projects cannot be compared with conventional ones, since costs associated with them might lead to different attributes that could differentiate the value of the project. This proves the need for a different system to evaluate tendering offers, since the traditional system promotes the lower cost solution, which is not efficient in sustainable procurement. Thus, the authors propose "multi-criteria selection" systems as those that could enhance efficiency and exploit the benefits of sustainable procurement.

Ruparathna and Hewage (2015b) mentioned that competitive dialogue procedure (CDP) is a method that involves collaboration between different parties from an early stage and can enhance sustainable procurement especially in extensive infrastructure projects. Another method they proposed is procurement, engineering, procurement, and construction (PEpC), which exploits the expertise of the stakeholders to enhance the procurement strategy and achieve better results in the whole lifecycle of the project. However, these methods are considered innovative and according to the authors have not been adopted widely.

Nguyen, et al. (2018) discussed two methods for tendering evaluation: low-bid and best-value. According to the authors best-value evaluation may assist in improving the performance of the projects, for the reason that it manages to combat the assumption that construction performance is equivalent between contractors, as perceived in the low-bid evaluation method. Construction performance may have variations depending on the experience of the contractor, the methods they use and the personnel. Nevertheless, low-bid evaluation achieves funds savings in a long-term perspective, while offering transparency and simplicity. Another drawback though, is that the solution proposed is not assessed with quality criteria and evaluation of the technical description. Moreover, variations in the tenders might occur when the instructions and specifications are not communicated sufficiently, allowing various forms of interpretations.

On the other hand, best-value evaluation manages to exploit both cost and qualifications criteria to reach to the most optimal decision. One of the benefits realised is that this method can improve performance in a long-term perspective, thus taking into consideration maintenance and responsibility proposals. According to the research of Nguyen, et al. (2018), the differentiations of the two methods are not translated with the proposal of different tenderers, respectively. It occurred that many times the best-value evaluation method proposed one of the top low-tenderers. This can be interpreted by the fact that experienced contractors do not come at a higher cost, since they can deliver solutions in a more efficient way.

Another issue that might occur during tendering evaluation is the detection of unbalanced tendering. Unbalanced bidding is a process where contractors try to increase their profit, while trying to offer a competitive tender offer (Li, et al., 2021). This is usually achieved by increasing the prices in some items, while decreasing prices in others, to achieve the same total price in the tender. Li, et al. (2021) mentioned that usually this problem is hard to identify or might cause delays in the delivery of the project. According to Li, et al. (2022), although unbalanced tendering is unethical, the clients only have the right to suggest item prices and not force them. A feasible way to

avoid this issue is by providing extensive description of the various parts of the project and by making decisions based on the subjective view of the clients on the experience and understanding of the contractors to the project (Li, et al., 2021; Li, et al., 2022). Making decisions based on the average prices of the tenderers might be another solution, but if the sample is small, it could be that all the tenderers are unexperienced on a particular solution and might all provide unbalanced prices. The authors suggest that it is essential for clients to build a database so that they can compare future prices. However, the process of identifying unbalanced tendering usually is considered as demanding in terms of resources (Li, et al., 2021).

Referring to the study of Gupta and Nair (2021), TOPSIS analysis is a way of evaluating multi-attributive objectives. Opricovic and Tzeng (2004) elaboratively explained that TOPSIS analysis chooses the winner out of the alternatives that have the closest value from the ideal value and the farthest value from the non-ideal alternatives.

Ruparathna and Hewage (2014) made a list of the existing methods from different sources to evaluate the three-bottom line of sustainability (environmental, social, and economic) which consists of:

- *The awarding bonus points method* where tenderers will get extra points if they offer supplementary criteria beyond the least project requirements.
- *The evaluation matrix method* is when evaluation is conducted by constructing an interdisciplinary matrix which should cover the technical, sustainability, and financial criteria. Thus, being judged by the third party (consultants) chosen by the clients.
- *The CO_2 emission basis method* is used by assessing the tenders grounded on the amount of carbon emissions will be produced and allows carbon reduction commenced by clients.
- *The Risk and Opportunity analysis* where clients analyse the risks and opportunities of doing the sustainability works in the initiate procurement by comparing it with the company's sustainability goals.
- *The Qualitative Judgments Method* where the tenderers are evaluated through their experience within three bottom line of sustainability works which they should explain in a document and accordingly will be assessed by the suitability to the client's expectations.
- *The Value for Money Analysis* is when the clients choose the most worth offer in terms of the price and its relation to the sustainability requirements, and usually used in the public procurement.

4 Empirical Results

This chapter aims to provide a holistic presentation of the empirical findings that are result of the interviews. It is explained how these findings pinpointed the critical issues and then the themes that were constructed are developed by motivating assumptions with quotes from the transcriptions of the interviews.

4.1 Workflow of Thematic Analysis

The empirical results are findings derived from 8 interviews with project, strategic and sustainability managers from various companies that work with property development. After the completion of all the interviews, the recorded interviews were transcribed, and in sequence were studied with the most important parts being identified and highlighted. This led to the collection of various essential information per interviewee, that showed a potential matching between the different opinions of each interviewee on specific themes. Thus, the abductive reasoning procedure was followed to analyse the findings of the interviewees, since the interviews investigated phenomena proposed by the theory, but then the crucial issues and themes were defined by the results extracted from the empirical data. To perform this type of analysis, an affinity mapping tool was used to have a more visual realisation of the results. More specifically, all the main points from each interview were written in digital sheets and were collected on one board.

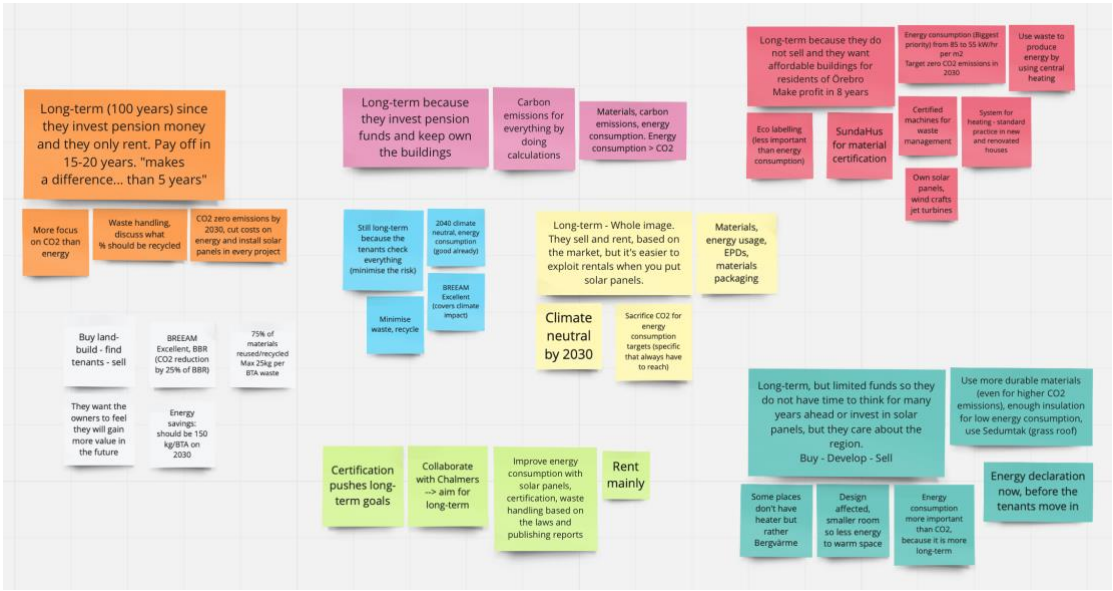

Figure 4.1 Example sample of the creation of digital sheets per interviewee.

From all the main points written in the digital sheets, various themes were identified enabling a categorisation of answers into sub-groups. After the patterns were realised and distinguished, they were labelled accordingly. Different colours were used to facilitate the distinction of the sub-groups. It is prominent to cross-check if the points are in the suitable group and/or if the group names are representative for the sheets. After the crosscheck process, restructuring and renaming were conducted. Consequently, sixteen groups were created, which consist of: long-term perspective; environmental criteria; circular economy; materials; holistic driver; contract relations; responsibility; reputation; LCA; certification; Boverket's regulation; UN SDGs; working conditions; social criteria; economic criteria; and tendering evaluation.

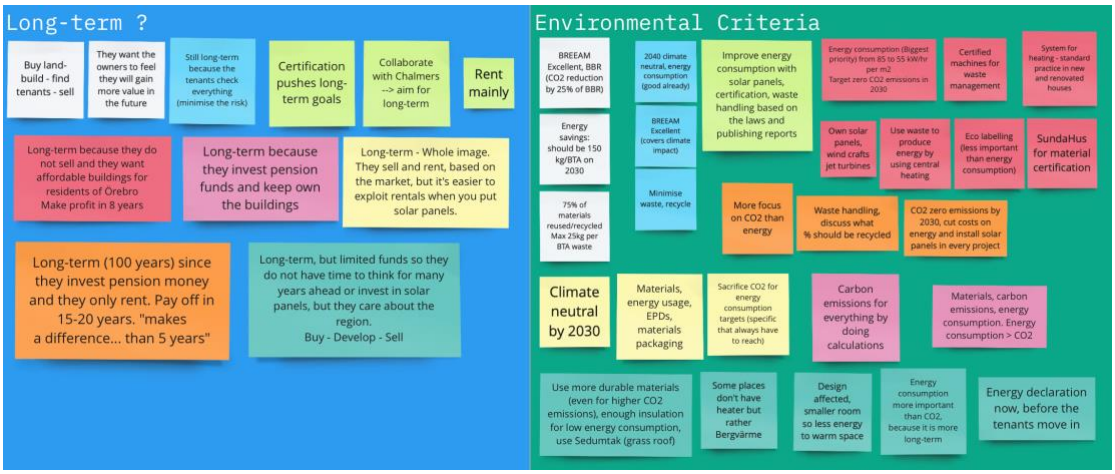

Figure 4.2 Example sample of the categorization of the main points in distinct groups.

Hence, the distinct groups were being matched to each other and the relation between them was examined. After the relations between groups were drawn, they were coloured and named into 6 different subthemes. The subthemes defined are the future potential development on environmental sustainability; the link between personal ideology and marketing; the cost-related aspects affect the decision-making; the vagueness of social sustainability; the tools and legislation in enhancing the implementation of sustainability; and finally, the subjective view on longevity.

Those 6 subthemes were compared to their relevance to broader topics and matched into 3 general themes that assisted on the holistic presentation of the empirical findings and the development of the analysis. The 3 themes that were composed are: the long-term perspective, reputation, and responsibility; the criteria to sustainability; financial aspects and tendering evaluation.

4.2 Theme I: Long-term perspective, Reputation and Responsibility

To understand sufficiently how the property developers select those requirements and criteria and what drives them towards this direction, it is important to understand their strategic view on property development. Three areas were identified as the defining points of this strategy:

- Views on long-term perspective
- Reputation and competition
- Responsibility.

Views on long-term perspective

The long-term perspective is considered to be an important strategic decision by most of the interviewees and is believed to promote the implementation of more sustainable requirements and criteria. This, of course, is related to the fact that sustainability aims on being able to reduce the resources that cannot be reused in the future, while helping the society develop and not harming the environment.

> *"We as a company are responsible for pension money… So, we are thinking of it from a very long-term view when we feel we have the responsibility so that kids that are born now should have a pension to live on in about 100 years and they should also have a society to live in, where*

they can be able to live and dream and feel safe and secure, but they should also have a planet to live on that fail safe and wealthy."

(Interviewee #5)

"We design and develop them, and it is always with the horizon of it being a good building for you for 100 years, so we don't put anything in there that is sort of for this short-term gain as such, we've got a longer horizon. We can invest money in something that is not really paying off until like maybe 15-20 years' time. That's certainly one of the things that is a benefit of the company owning the property for a long time."

(Interviewee #8)

"It's easier with the social part when you develop and own the premises… then you can work more long-term with that focus, and you are also a part of the community."

(Interviewee #4)

Nevertheless, although it seems that most of the interviewees claimed to have a long-term perspective, it appears that this perspective is explained differently by each interviewee. This is mainly based on the fact that each company has a different strategic plan. Companies that aim to own the buildings and rent them are more prone to invest more in attributes that will increase the value of the buildings in the future, for instance making decisions based on energy consumption. This might be mainly affected by the fact that they aim on making profit in more years than when you sell, thus permitting them to act in a more flexible way.

"We are trying to talk a lot about getting away from this short-term in the projects and talking about the lifecycle of the building. So, then I would say that we prefer good insulation because it's better in the long run."

(Interviewee #5)

"Given that we own the buildings for essentially eternity, we try to cut down that kind of cost (energy consumption costs) as much as we possibly can."

(Interviewee #8)

"We have other business, which is our rental apartment stock, which we own long term. In that case, we have worked with the energy efficiency for many years and continue to do that and work more with renewable energy."

"We tried to have the same ambitions overall in both our business parts (rental and selling), but then it might be that it's easier to install solar panels in rental apartments that we own over a long time, because then we can take the benefit from that equipment for over a long period."

(Interviewee #4)

Companies that aim to sell the buildings, invest more on attributes that the future building owners value as important and are willing to pay substantially more for them. Usually, such attributes can be environmental certifications, for instance LEED, Miljöbyggnad, BREEAM, etc., which are valued by the tenants (Interviewee #2 and #3), or even certification on materials or more detailed descriptions (Interviewee #7).

"So even if we put things that pay off in a long range, that is possible to be positive for the next owner, we have to find ways to show this and get

paid for the efforts we take that maybe pay off in about 10 years… For example, BREEAM, it's probably paying in the long-term. But our buyers get cheaper loans if they buy a BREEAM certified building. And then we can get more paid for that."

(Interviewee #2)

"If you do Miljöbyggnad Guld or BREEAM or LEED, those you do long-term to make sure that the building is sustainable over time. It needs to be long-term otherwise it falls on its own merits…"

(Interviewee #3)

"We sell to people that will check if we have been thinking about the long-term. It can't be like okay, now I will just choose this façade, I know it will be nice five years and then I don't care because I sold the building… It will involve a lot of people checking all the drawings, technical descriptions, and materials you choose. They will check everything, and they will ask the question what risk do we have with this product, what's going to happen with the facade, what's going to happen with the installation? … My work then is to minimize the risks to get more paid for the building when I will sell it."

(Interviewee #7)

Another aspect that differentiates the long-term perspective of each company is the purpose of the building or the targeted future owner. Companies that have a more local impact seem to be affected by it and feel the urge and social responsibility to provide solutions that will help their region prosper and mitigate problems since they also have a very direct response from the public. Direct relations with the society might also be linked with personal incentives to do something better for the region, but also for planet earth and put a stamp on the area that this particular company is proud of.

"It's a very, very long term for us. We build our houses to have them for all time… The municipality says that if four people want to move to [city], we have to have apartments so they can stay or move in and that's our responsibility."

(Interviewee #1)

"We live here where the most of our development is being built. That means that we for example run in to our customers in the local store, so it is important for us to feel proud about our buildings. Although we sell our buildings right away that's one of the reasons why we put a little extra in our developments. Otherwise, I had to go shopping in the next municipality."

(Interviewee #6)

Similarly, a company that has long-term collaboration with a foundation, can understand better their needs, future challenges and aim more efficiently in long-term targets.

"Our biggest tenant is [foundation] and we are owned by the same foundation, so we don't have to make millions to put in the pocket of our owners. We exist to make sure that [foundation] has longevity in their planning of the different houses and building, so we can afford to pay our entrepreneurs or our contractors with what is a fair price."

(Interviewee #3)

At the same time, this stamp might be related with the creation of an area with high living standards that will increase its value, thus raising the value of the buildings. In other words, the value gained by investing in more sustainable solutions drives them to promote those solutions and rethink the way they design or build and at the same time achieving financial sustainability for their company or their funders.

> *"We develop properties that we plan to own for a very long period of time… We got a big influence on the area, and we can sort of put our stamp on it and so we want to change and transform the area from where it is now, where people come to work 8 to 5-ish and then out of office hours it's dead, and as a consequence it's perceived as not being very safe or attractive. So, we want to sort of make sure that there is life 24/7… The idea is that overtime as we develop the other it will become a nicer area and therefore in maybe 15 years' time, we will get more rents from the offices than we will from if it had only been offices in the building. So, from a long-term perspective it's good business."*
>
> (Interviewee #8)

Interviewee #6 stressed that this long-term perspective is immensely affected by the size of the company and its financial capabilities. Companies that do not have the funds to finance more employees to investigate more sustainable solutions; or cannot finance contemporary innovative solutions, have restrained prospects on advancing their thinking in more long-term perspective.

> *"But we don't look at our investment in 50 years or 100 years. So that has an effect, of course. And that's what we could do with Miljöbyggnad or LEED, but it's also only me who works with the project, and I don't have the time or if I'm going to put it on consultants, then it's going to cost more. So, you have to compare all these and we as a small company need to find a good balance and focus on some of the parts in the development that really make a difference."*
>
> (Interviewee #6)

Reputation and Competition

Another driver that is related with the financial sustainability of the company is the need for good reputation and building trust with their customers and convince them that their products do not harm the environment and at the same time can help the tenant save money in a long-term perspective. Consequently, companies are willing to implement sustainability, to improve the sales of their solutions or sell them at a higher price.

> *"I think to be a player on the market you need to work with this… We also see that there is of course a relation between profitability and sustainability as well. If you succeed to change materials, recycle more, and reduce energy, then we can also save money and become more competitive. But that will probably come in the long-term. Right now, it will probably be a cost driver to make this shift."*
>
> (Interviewee #4)

> *"We do compete at an open market, when we try to get tenants, external tenants that it's not [foundation], we need to make sure that we have a good reputation and now we see a trend that more and more people are*

looking at their property owners to see what they do to make sure that the world won't go up in flames..."

(Interviewee #3)

Likewise, failing to develop sustainable solutions illustrates a company that fails to be contemporary and in order to keep up with the competitors in the market, they are obliged to provide sustainable solutions or else they fail to survive.

"It gives us an edge in the market. We are perceived as a company that is on the forefront of what is actually being done. And this makes us more attractive for companies when they're looking for somewhere to put their offices in. So, it may not be the only driver, but it's certainly from a company perspective, one of the most important ones."

(Interviewee #8)

"And I do think lots of the developers we are competing with, take the same steps. And if you don't take the steps you are lost, I think."

(Interviewee #2)

Failing to achieve those sustainability goals might also have a negative effect by the press, if the company is dealing with projects that affect considerably the area or funded by public foundations.

"We really can't afford to mess this kind of things because the press really likes to write about [foundation], especially if [foundation] does anything wrong. So, we always make sure that everything is on point when it comes to follow the laws and follow the rules."

(Interviewee #3)

Nevertheless, this reputation needed to increase the value of the project appears to not reach its full potential. Many property developers mentioned that although they promote sustainable requirements and criteria, many times this success is not communicated to the end-user of the building, so that they could understand the benefits of living or working there or is only communicated if they are asked (Interviewee #7).

"I would say that we haven't been so excellent in these communications to our customers, we are realized that we could do better. To some extent, of course, when we start in your area and want to sell apartments, we talk about what we do in that area… And we also tried to gather people even before they move in and have activities, so they get to meet each other, and it becomes a more social security feeling in the area. So, to some extent they recognize it. When it comes to our rental apartments, I don't think we communicate so much because then it's more like one of apartment."

(Interviewee #4)

"The tenants cannot feel it always. If it's a concrete building, it will be a bit hard to see the difference, but when we build in wood then when you come in the building, you can see it directly that this one is different… I guess that when we have a BREEAM certification in the entrance, we have a logo of BREEAM that it's Excellent, just to say this building is certificated."

"Sometimes we inform our tenants before they will move in the building about all we have been thinking about sustainability, but this is because

also they wanted us to do… they asked us to go to their employees and to make a presentation about the project and the sustainability program that we had for the building because they think it's important… But it's not everybody that asked for it, actually."

(Interviewee #7)

Interviewee #5 explained also that they prefer to communicate only targets that they can reach and not say big words that they do not stand for, to establish their credibility.

"We need to work with that, with how we should communicate. But it's very, very important for us that we don't say anything that we don't are or can stand for. Then it's better that people know less about us and then they hear something that we've done… It's very important for us that we don't go out and say something that we are not right now, then it's better to wait and be like pretty sophisticated in our communication…"

(Interviewee #5)

Responsibility

The driver that pushes property developers to adopt sustainable criteria might not only be profit or reputation. Although the responsibility of the government was noticed by most of the interviewees, they also recognised that the property developer is the one that must initiate change in sustainability, coming from their ideology and their ambition to lead the market and survive in that context, while also reassuring future finances.

"I think the overall responsibility got to be a governmental responsibility surely. But we see it as good business and we need to drive that agenda. We see it as some means of securing the company's economy for a long period of time. But we know that if we design and build buildings that have a smaller impact on the environment then it will make us more attractive as landlords. So, for us it is driven partly by ideology, but more importantly by sort of business perspectives."

(Interviewee #8)

"It cannot just come from the government. It has also to come from the private sector. And I guess the private sector, they understand that if you don't build sustainable, you will not be able to sell your products in the future because everybody is asking for sustainability. We always try to develop our sustainability strategy before the government says you have to do this. So, we always try to be a bit proactive, but I think that not everybody is proactive… The government also tried to force some actions that they're a bit lower, more reluctant to this development."

(Interviewee #7)

Another interviewee proposed that the property developers should be the one defining the agenda on sustainability and the government, who also bears responsibility, should track this agenda, and adjust to it.

"I think it's both ways. The government is responsible of course, but I think it's up to us to be able to drive the agenda forward and to educate the government, how it should be done and try to evaluate the work forward because it's going pretty slow. The government needs to have standards that they think of and evaluate from, and we need to consider them of course. But we also need to improve them to be able to work faster and

also be able to create the good business case. And that's driven by yourself, but it's also driven by our partners."

(Interviewee #5)

The cause of this might be mainly because the government in Sweden, only sets a minimum set of requirements that most of the big property developers always manage to surpass as a target deriving from their business incentives and driving factors, while defining the future agenda. Consequently, the lack of strong governmental interventionism leads the property developers to recognise their responsibility to the society and develop awareness on the sustainability issues.

"I think that's a Swedish way, that we choose the other way so everyone will be in it. So, we (Sweden) put the target to 100, but you have to get to that. For the best, it's very-very easy, because they are in the 50 level and after some years, they put it down and then it is more difficult."

(Interviewee #1)

Nevertheless, there are opinions that urge for stricter requirements or tougher regulations to make a fair market, since there are competitors that can still offer low-cost solutions that do not meet the high sustainability criteria that others set, thus creating an unfair competition.

"We as a small company don't have a lot of overhead costs. So, we can bear the cost for an extra insulated construction or have the bricks mounted on site instead of prefabricated elements. But you can't only do it for so long if everybody doesn't do the same. So, I would like to see more incitements from the government."

(Interviewee #6)

"If you don't have rules defined by the government or the municipality, you run the chance or the risk of getting an unfair competition on the market, and then some companies choose to do everything fair and safe for their workers, while some do not put working environment requirements or sustainability requirements and they can keep a lower price, because they don't do it by the book."

(Interviewee #3)

"I think you should put the aims higher, because the techniques are there, at least for most part of Sweden, and customers can pay for it. So, I think you should put higher requirements to lower the energy consumption, because some developers or contractors they try to do it, but not everyone is doing it. That's the problem."

(Interviewee #6)

Although, according to Interviewee #4, the contractors have poor ideas or do not have the financial ability to fund those ideas, they should still share the same mindset and set requirements on their suppliers.

"We as a product developers must of course put requirements on our contractors, and we need to put requirements on their suppliers or materials to rethink which materials and transport they use. So, I would say that all parties must do their part in order to enable a climate friendly construction…"

(Interviewee #4)

Equally important, according to the same interviewee, is to set national standards that will not differ per region, and this could promote standardisation, which can improve sustainability and efficiency.

> *"All parties must change their way of working and the municipalities they need to rethink how they put requirements on the building plots in their detailed plans, so it's possible to work with more sustainable materials and designs of buildings."*
>
> *"All the municipalities, even the small one they have now quite high ambitions when it comes to creating city areas. So, it's very difficult to come with a standard product that is industrialized and efficient and put that on a land."*
>
> (Interviewee #4)

4.3 Theme II: Criteria on Sustainability

The practice of sustainability work in the construction sector is somehow dependent on the requirements requested by clients during the procurement process. Clients, in this study as the interviewees, have the power to require how they want the projects to be carried out. From the interviews, the subthemes of sustainable criteria were categorised into:

- The future potential development on environmental sustainability
- The vagueness of social sustainability
- The tools and legislation that enhance property developers to implement sustainability.

The future potential development on environmental sustainability

The environmental criteria seemed to be the centre of attention, in comparison with the social and financial ones. A lot of interviewees uttered their concern regarding the environment, especially when it comes to climate change. Five out of eight interviewees exclaimed they want to be climate neutral either in 2030 or 2040.

> *"...So, we have many goals that for example is to become as climate neutral as possible towards 2040..."*
>
> (Interviewee #7)
>
> *"...we have quite high focus on that, and dioxide free emissions for 2030, zero CO2 emissions in 2030..."*
>
> (Interviewee #1)
>
> *"...But we have carbon dioxide goals that we should lower it by 50% until 2030 for example..."*
>
> (Interviewee #2)
>
> *"...environmentally it has been a very important thing in what we do for many years. And it's just getting more and more, so we're on a journey towards a 0-carbon activity as a company..."*
>
> (Interviewee #8)
>
> *" ...the environmental aspect, it's a lot of focus now to start the transformation from a quite large impact when it comes to CO_2 equivalence to reduce that as much as possible and become climate neutral in 2030."*

(Interviewee #4)

The CO_2 emission has been the most well-known topic during the interviews, but there is one interviewee, Interviewee #3, who would rather see the whole perspective, not merely lowering CO_2 emission.

> *"…We look at a try to see it as a whole for a lot of people, sustainability only refers to environment and CO_2 emissions, but we want to see it as a whole…"*

(Interviewee #3)

In order to achieve the goal to be climate neutral, the interviewees propose different solutions. Few interviewees only focus on the materials and others only focus on the energy consumption, while some may focus on both. One of the efforts often mentioned by interviewees is the development of materials such as using reused/recycled materials, materials certification, and durable materials. There are some interviewees that affirmed they only use materials from trusted suppliers or as Interviewee #1 claimed, even trying to find choices of sustainable materials with certification like *"SundaHus"*.

> *"It's called 'SundaHus' in Sweden… when you have ABC&D and then we say we will just have materials from the A level and the B level. If we will have some at the C or D level, we have to make a special decision…"*

(Interviewee #1)

Interviewee #8 prefers the database *"Byggvarubedömningen"* to check whether the materials proposed by contractors are acceptable or not.

> *"…we work with various systems to classify each type of material that we use for the building. So, for example, doors or paint, carpets, or everything, they need to be checked against a system called 'Byggvarubedömningen'… it classifies construction material from around environmental perspective…"*

(Interviewee #8)

Sustainability can be achieved through the selection of more sustainable materials. However, as described by Interviewee #2, the availability of sustainable materials becomes a challenge, while another interviewee discussed the need of standardisation for materials to increase control and trust.

> *"In cement they had said that in a few years they will produce the carbon dioxide free cement for example. But today there is not so much…"*

(Interviewee #2)

While others are focusing on sustainable certified materials, Interviewee #6 expressed that the company's focus is on the durability of materials although they may have higher CO_2 emission, and even guide contractors to use complete concrete flooring and steel pillars, while determining the type of materials for façade and roofing.

> *" … we use durable materials, for bricks for example, even if it's more expensive in forms of CO_2 emissions. Then it stands there for hundreds of years and you don't need to maintain it as much…"*

(Interviewee #6)

The epicentre of environmental requirements is not merely towards materials but also towards energy consumption. Moreover, when being asked about their top priority on

sustainability, several of the interviewees explicitly expressed their considerations on energy consumption as their top priority among other things.

> *"It's the energy consumption, and then it's the durability for the building."*
>
> (Interviewee #6)

> *"I think the lower energy consumption is the biggest one for us, because it has the best effects… I think energy consumption, that's the one (top priority)."*
>
> (Interviewee #1)

> *"Energy is (more important than CO_2) …"*
>
> (Interviewee #5)

Interviewee #1 and Interviewee #5 then descriptively explained their practices of prioritising energy. Although Interviewee #5 considered more CO_2 reduction when conducting renovations.

> *"Now we look a lot of solar panels, so we try to have solar panels with batteries. I think we are one of the companies who have come most far with that, but we are in the study phase of that."*
>
> (Interviewee #1)

> *"...if we buy a new building, then the energy consumption is very important and to be able to show how can we make it better and improve it and for how many years can we do it and what will it cost etc. But if we are looking at a project where we are doing a bigger renovation, then it's the CO_2… to decrease the footprint from the building."*
>
> (Interviewee #5)

Based on Interviewees #1 and #6, they preferred diverse ways to optimise energy consumption such as installing solar panels, own wind crafts jet turbines, efficient heating systems, and even the design of the building.

> *"…we have much lower than the regulations and we work with the solar panels, and we own wind crafts jet turbines."*
>
> (Interviewee #1)

> *"…And then we also have enough insulation for low energy consumption. And we try to always optimize the plans, like for a 3-room apartment. Our ones (1 room apartment) are generally smaller than the other ones and that means you have less space to warm. And we use it with 'Bergvärme' (pipes under the floor to heat the apartment). And then sometimes we have used grass roofs, 'Sedumtak'."*
>
> (Interviewee #6)

The interviewees are well-aware of the energy limitation, and Interviewee #1 claimed that the company's biggest priority is energy consumption by having 55 kWh instead of 85 kWh as mentioned in the Boverket's Building Regulations (BBR). This was asserted to be achieved through the process of waste to produce energy by using a central heating system.

> *"...And for the environmental focus, we focus on energy consumption very much because that's the biggest for us. I think, in Örebro we have like 80 kWh per square metre now and then we achieve 55 instead. So, we have much lower than the regulations..."*
>
> (Interviewee #1)

In addition, it is explained by Interviewee #1 that Sweden applies central heating system to distribute electricity.

> *"So, in Europe you don't have a lot of central heating. You have each apartment that they own gas or things like that. But in Sweden, I think almost every municipality has their own central heating system"*
>
> (Interviewee #1)

Furthermore, Interviewee #1 stated that the company was also motivated to share the energy between their buildings.

> *"…But we also work now with sharing energy between our buildings. But in Sweden it's not allowed. So, we have worked a lot the last two years to get the government to change their rules because they are… 100 years old. But the energy companies don't want that, because they earn more money… but now they started to change in that way."*
>
> (Interviewee #1)

Interviewee #6 explained that they try to achieve lower than 85 kWh, and usually they achieve 75 kWh, proving that they do better than the regulations.

> *"We have the requirements and for example with energy consumption where we're putting the contract that you need to reach 75 kWh."*
>
> (Interviewee #6)

Regarding the CO_2 emissions, Interviewee #2 noted that the company is trying to lower the carbon dioxide emission and they have the goal to be 150 kg/BTA by 2030.

> *"In energy and carbon dioxide, we have taken decision… that until 2030 we should have half the power footprint of 2020, so it's from 300 kg per BTA to 150 kg per BTA."*
>
> (Interviewee #2)

The other interviewees considered the CO_2 as their top priority since they were good already with lowering the energy consumption. Nevertheless, most property developers during the interview claimed that they are working with both carbon emission and energy consumption.

> *"…I guess the main one in the project I'm working now it's climate, so CO_2 focus. Because, minimizing the energy, we became very good in that and the new projects they already get that…"*
>
> (Interviewee #7)

Overall, most of the interviewees are focusing on the installation of solar panels, which assist in the achievement of energy consumption goals, thus making buildings more valuable for the tenants.

During the interviews, some questions focused on circular economy, even though this topic is very fresh for the industry according to some interviewees. When talking about circular economy, many interviewees referred to the waste management and reusable building materials/building components. Four of the interviewees instanced that they reuse or recycle some products in other projects/buildings.

> *"…we tried to have a high level of reused building materials…"*
>
> (Interviewee #3)

"…we're working on reusing some of the concrete from the demolishing of previous buildings and to reuse that as part of the new concrete mix that we're getting for the new building…"

(Interviewee #8)

"We said about 75% of the material should be recycled or reused…"

(Interviewee #2)

"…we have demands that so much as possible should be reused…"

(Interviewee #5)

Furthermore, Interviewee #8 elaborated their practices in reusing, when the product does not fit to their current project, then they circulate it to other projects even of other companies. Interviewee #5 emphasized that if the contractors can neither reuse nor sell the products, they demand from the contractors to recycle the products.

"…So, for example, a door like this one, we would take it down and we would see, do we have another project that is coming up in Gothenburg right now that could make use of the door? And if we find one, we send it off to that project and maybe it needs to be repainted or have some scuffs done up or whatever. And if not, we try to give it to some other projects that are not ours…"

(Interviewee #8)

"…we have demands that as much as possible should be reused, and if it's not possible to reuse it, then we want to sell it or use it in another building. But then we have demands that the contractors should recycle it in the right way, if we can't sell it or it can't be used again."

(Interviewee #5)

The concern expressed by two interviewees is that the reuse should be done by seeing the whole picture and that reusing should be considered if it is good for the environment, while another interviewee explained a different perspective by connecting reusing with economic considerations.

"…if we are going to reuse it, we need to make sure that this still works long-term, we can't put the light that we think will break in two or three years.... So, it's not reusing stuff for the sake of the reuse, but to make a good environmental decision."

(Interviewee #3)

"In Sweden we think that if you use it again it will be a lower cost because you have already bought it, but it's more expensive for us to paint a door than to get a new one."

(Interviewee #1)

Moreover, it is also being said that BREEAM does not assist on the further implementation of circularity because of its point system.

"We use BREEAM mostly and then it's sometimes you cannot reach a high point in the certification if you reuse stuff and so on. And that's a problem because you want high points for the certification because that's good for the building and that's what the customers use. But you also want to reuse as much as possible."

(Interviewee #5)

While another interviewee said that reusing concrete does not help in achieving the CO_2 targets.

> *"…we're working on reusing some of the concrete from the demolishing of previous buildings and to reuse that as part of the new concrete mix that we're getting from the new building, which doesn't do much for the CO_2. And it saves some of the mountains from being blasted out… So, there are lots of different things that we're trying to get into the mix for reducing the environmental impact."*
>
> (Interviewee #8)

Tools and Legislation in enhancing property developers to implement sustainability

In connection with the environmental criteria, tools and legislation have been discussed during the interviews. The combination of both composes a method to achieve sustainability, mainly regarding the environmental sustainability pillar. The legislation focused mainly in Boverket's new climate declaration regulation and the tools involved United Nation SDGs, certification, and Life Cycle Assessment (LCA).

Since January 2022, the new climate declaration from Boverket has been put into action for property developers when constructing new buildings. Nevertheless, it seems that the new climate declaration did not affect the work of five interviewees, because they have applied the climate calculation earlier before the regulation was implemented.

> *"I think it's hard to compare to anything but since I've started, we've been aiming that we should do this CO_2 calculation for everything we do and that's just the way we want it."*
>
> (Interviewee #5)

> *"I guess it will not change a lot because we already work with that, with sustainability and we have consultants that are working. So, I don't think it will affect that much."*
>
> (Interviewee #7)

> *"…So it may be that we need to transmit and hand over a document, but it's something that we're already sort of working on, so it's just sending them a copy."*
>
> (Interviewee #8)

> *"That hasn't changed our work so much since the local road map in Malmö LFM 30 Corporation has been working in advance with the legislation. So, we have already started to do climate calculations…"*
>
> (Interviewee #4)

There is one interviewee that claimed the company has prepared for that to be requested during the procurement phase, and another interviewee mentioned they have not noticed it.

The type of projects also influences the application of climate declaration, since for Renovate, Operate, Transfer (ROT) projects climate declaration is not obligatory.

> *"…our main focus is what we call a ROT project. It's short-term ROT projects, 'renovation och tillbyggnad'… So, say we build a new house maybe every 5 years and a big one every 10 years… And I don't think this declaration was in place 2013 to 2015…"*
>
> (Interviewee #3)

The fact that Boverket only requests for climate declaration, without any limitation, has risen into debate. Some interviewees said that this low limited regulation is important to help the smooth transition by allowing everyone to reach the goals, which helps improve the sector.

> *"I think the new law really helped the sector to improve and to be able to put this on the agenda for other companies."*
>
> (Interviewee #5)

> *"But I think if you look for the whole sector, I think it's been very good and it's been helpful to improve the calculation and the discussion about how to do it."*
>
> (Interviewee #5)

> *"They start in a very easy way so everyone can learn to ask about it and work with it, so they haven't set the limits in the beginning just that we have to do it."*
>
> (Interviewee #1)

On the other hand, the minority of interviewees noted that there is a need for stricter regulation because the company's target is always better than the legislation.

> *"Boverket so far hasn't set any goals. They said that you have to do these calculations. So, I would say that the legislation part is a little bit behind the industry at the moment."*
>
> (Interviewee #1)

The discussion about UN SDGs with interviewees was not extended, only some key points were discussed. For four interviewees, the most relevant UN SDGs have been included either as a guidance for strategic planning or as a communication tool to the tenants.

> *"I think we always have worked in that way, but when the international goals [UN SDGs] come, it was interesting to compare if we are on the right way or what do they mean in each of them and are we working already…"*
>
> (Interviewee #1)

> *"…we have for each project that we developed, we take a sustainability program for it and then we try to translate into the 'FN' (UN SDGs) goals…"*
>
> *"…when we talk to potential tenants, for example, it may even be easier for them to understand how we work with sustainability, because there is a lot of them that are working with those 'FN' (UN SDGs) targets, so then it will be easier to make this connection between their own sustainability strategy and what our project brings to our era, that there is this connection between the two things."*
>
> (Interviewee #7)

> *"We have evaluated those and decided which goals that are most relevant for us to have as a base for our sustainability work. So, we have selected, I think, seven areas which are more natural to our part of business that we have as the guidance for our strategic planning."*
>
> (Interviewee #4)

Interviewee #5, which is one out of those four interviewees that applied the UN SDGs, emphasised that the company has investigated more-detailed points of UN SDGs goals as their target and goals. Basic knowledge of UN SDGs is admitted during the other three interviews and only one interviewee had no correlation at all with UN SDGs.

> *"…we have our strategy finished by the 1st of April and then it's linked to the sustainability goals, but I can't speak more about that right now since it's not published yet. But we are working towards them and to the 169 points below the goals."*
>
> (Interviewee #5)

The most common tools used by property developers to achieve sustainability are Life Cycle Assessment (LCA) and certification. Six out of eight interviewees agreed that the output of LCA has helped them to make the most optimal decision for design, materials, or methods.

> *"…I think often we do it before if we should have 'betong' [concrete] or timber or what we choose. And then we do the LCA before and we choose, or it could be when we change something in the project… And then we can look it in on LCA for a small part…"*
>
> (Interviewee #1)

> *"…that it's still helping you to improve your product and you can still compare the environmental impact of two materials or two construction methods and say that is certainly better…"*
>
> (Interviewee #8)

> *"…you need to have LCA quite early in the project we are working with it all the time. When, for example, we will choose what will we have for the roof? What kind of material are we going to choose then? There is always our consultant that is calculating how much CO_2 impact the different options have, and we also compare the price and then we make active decision about, okay this one we take it and this one we cannot because the CO_2 impact is too big, for example."*
>
> (Interviewee #7)

Interestingly, most of the interviewees are still reliant on consultancy service to do the LCA calculations. They even admitted prefer to use the same employee in the consultancy company to do the calculations.

> *"So, our way of handling this is to try to decide which tool should we use and then have a long-term relationship with one consultant that makes all energy calculations for instance, and not only one consultant company. It must be the same persons within that company. So, even if they calculate a bit wrong, they at least do the same wrong assumptions in each project and then we can compare the products because if you go to two different persons with two different software you can get the on paper or result that you never know if that difference is true or not."*
>
> (Interviewee #4)

> *"So, we've got a couple of their employees [consultants] that know [company] well and have worked with us on a number of projects, so they help us with that (LCA calculation)."*
>
> (Interviewee #8)

Regardless the accuracy of the result of the LCA, one interviewee stated that they see the LCA as a tool to make the most optimal decision, although the final results could be wrong, the comparison has a lot to offer in their decision-making (Interviewee #8). While Interviewee #5 mentioned that its credibility is dependent on the structures of the company and the knowledge they have built around it.

> *"We compare my project down there [project] with my colleagues here in Gothenburg, Stockholm, and Malmö and so on. So, we've got a benchmark. In the end of the day, you don't know if the figures are correct or not, you need to just trust it and use it as a tool, whether it's right or not… It's still helping you to improve your product and you can still compare the environmental impact of two materials or two construction methods and say that that is certainly better than that one, whether the figures in the bottom end are great or not, it doesn't really matter…"*
>
> (Interviewee #8)

> *"And I think to be able to do it (LCA) in a really good way, you as a company need to have the knowledge to know what amounts you have and what kind of methodology you want to work after…"*
>
> (Interviewee #5)

One interviewee mentioned that the calculation of LCA is better done during the early phase to get the most benefit out of it.

> *"…the earlier the phase we do this LCA calculation the more possibility we have to take the right decisions. If we start to have LCA in the 'systemhandling', we have not very much space to do there. I think it will limit our decisions."*
>
> (Interviewee #2)

The focal point associated with LCA is the environmental certification. There are several types of environmental certification for buildings either international certification like BREEAM, LEED, Ecolabel or Swedish certification such as Miljöbyggnad. Half of the interviewees explained the application of certification depends on the buildings and the need of the users. However, some said they mainly choose the most well-known certification.

> *"…if we buy an existing building then we don't have any demands for certification. But we have demands within our company that we want to certificate as many buildings as possible. So often we buy a building that doesn't have a certificate, but then we do it by ourselves, in a three-year period..."*
>
> (Interviewee #5)

> *"We don't have any standard certification like LEED, BREEAM, Miljöbyggnad. We evaluate each building on its own merits. If it's completely new construction, then we decide from building to building…"*
>
> (Interviewee #3)

The other half of the interviewees uttered their requirements for specific certification. Two interviewees request BREEAM Excellent, one interviewee requests Miljöbyggnad Silver and SundaHus, and one interviewee requests LEED Platinum.

> *"We work with LEED and only LEED Platinum, so only the sort of highest standard of LEED."*

(Interviewee #8)

"…we always certify our projects with BREEAM Excellent. And if we do housing, residential buildings, then it's Miljöbyggnad Silver."

(Interviewee #2)

"Miljöbyggnad Silver for the new buildings…Yeah, it's SundaHus one of that…"

(Interviewee #1)

"We are usually working with BREEAM and that's our standard, but we also we have one building that it's LEED Platinum and we also have the Swedish Miljöbyggnad."

(Interviewee #5)

The vagueness of social sustainability

While environmental sustainability can be facilitated by various efforts and there are diverse ways to assess and measure the success rates, the social sustainability topic is being limited to working conditions and social criteria, in view of the fact that social sustainability is considered to be difficult to measure by two of the interviewees as they expressed.

"It's quite difficult because there will be a lot of things in the contract which you say that the contractor will do, but then they just can't… and if they don't there's no fee, there's no penalty, there's no bonus tied to it. It's very difficult to hold them accountable."

(Interviewee #8)

"…in the project I'm working now, we're saying we will go to the schools in the surrounding area to present the project and to talk about sustainability in construction, maybe to inspire people and maybe they want to work with this kind of project in the future. This how do you calculate? We can mention it that we did it, but you don't see the impact of such things that you do."

(Interviewee #7)

Although it is realized by some interviewees that social sustainability is difficult to measure, many interviewees mentioned their efforts have a positive impact to the society, for instance by hiring or training students (Interviewee #5), unemployed people (Interviewee #8), or citizens that are facing difficulties in the society (Interviewee #1, #4 and #7).

"I think it's very important…and we can say that we can take 20 young students within here that maybe had problems in life, but they can come here, and we can help them to learn and educate themselves really in the constructing business. Then we can help them get a job. They get into the system if you have a job, then studies show that you feel better and you don't do any crimes…"

(Interviewee #5)

"Some projects we've got an obligation on the contract to employ a percentage of the people that are working on the construction site and need to come from a background of 'I've been without a job for a long time' for example, or if you're new from another country and you try

integrate while immigrating to the country, but you find it difficult to get a job because of the language or whatever other reasons."

(Interviewee #8)

"In the social part we work with some difference. Often, we work with all contractors that work for us. They have to take people that don't have work and get them some experience."

(Interviewee #1)

"Because the idea is to work and train the young people who are not very good at coming to work at the right time and so on… we tried to educate them in the basic things, so they will be employable in the end."

"And we also have job trainings for young people within our business, for instance in gardening and so on."

(Interviewee #4)

"There are also tries to take people that don't have any jobs for example and have those social… take also people from the university that still didn't make any practice or internship and try to integrate them in the market."

(Interviewee #7)

Despite all, the majority of interviewees do not set any fixed requirements for hiring unemployed or students, but they are rather flexible based on their needs. Another way to implement social sustainability is by developing an improvement facility where people can go and learn (Interviewee #1) or developing ideas to provide a place where people or kids can go and explore themselves (Interviewee #4).

"We have something we call 'boskola'. It's for people who live in the area that we build, and they come and try to get experience in that way. So that's the largest one we have, but we have in every contract."

(Interviewee #1)

"We also run a private 'fritidssport', that's for young people to be after school and entertain themselves."

(Interviewee #4)

The fact that the construction projects affect the social life became a concern for two interviewees by requesting contractors to manage the construction activities such as logistic and high noise works, so they do not affect the city.

"We ask for it, but then there's a regulated process in terms of if you actually want to close off the street for example, you need to go about in certain way and there needs of signage and everything here. So, it will be safe anyway, but we can consider at reducing it."

(Interviewee #8)

"We have really a lot of forums where we just talk about that and try to make the best for everything and work with everybody because it costs a lot of money when you get delayed in transport logistics. So, minimizing the transportation and try to decide when you transport and which roads you use…"

(Interviewee #7)

Other responses from other interviewees propose that they are not yet considering the surrounding traffic but working on that currently. However, most of them try to lower the disturbance to the surroundings.

> *"We say that you cannot make noise between 5:00 o'clock in the afternoon to 6:00 o'clock in the morning, or something like that…"*
>
> (Interviewee #1)

> *"No, right now it's not more that we should reduce only high noises, it should all be within a certain number of hours, and it should be clean around our project and stuff like that."*
>
> (Interviewee #5)

> *"We don't have the complete understanding yet of the transport logistics impacts on our building sites. We are working in analysing that right now, so maybe we will put more requirements later on."*
>
> (Interviewee #4)

> *"We usually do the noisiest work, we try to do as early as possible to disturb as few people as possible, or maybe we do some work in the weekend when we need to..."*
>
> (Interviewee #3)

Albeit that one company claimed they set a parameter to contractors for hiring local subcontractors, they did not put it in the procurement requirements. Even so, they give additional points for those who hire local subcontractors.

> *"So, we knew how they work and if we invite a new partner to make an offer on our projects then we ask these questions like what kind of subcontractors do you use? Do you have your own personnel? And then we make our decision from the info we get. So, if the answer is that they don't have their own personnel and don't hire local subcontractors then that is worth less points in the evaluation compared to a company that does."*
>
> (Interviewee #6)

The interviewees were concerned about how social life is also extended to the development of the neighbourhoods so that the area has a more safe, secure, clean, and attractive environment. They feel that the building is not merely a construction result, but rather a part of the society.

> *"And then of course, when we develop new areas, city blocks, we have a lot of focus how do we get people in this area to interact, make them feel more secure, and find different ways of creating meeting points and so on."*
>
> (Interviewee #4)

> *"...so, we decided to only mainly build half of the footprint of the last building closest to the neighbours. In that way the development didn't disturb them as much. This we can do when it's an urban environment. With other projects, maybe a new development out in a forest that's going to be a housing area, we try to maximize what we are allowed to build."*
>
> (Interviewee #6)

"It's a lot about social development for example and how you build a new part of the city for everybody to be welcome to live or work in the area, so it's a bit larger perspective."

(Interviewee #7)

When discussing about social sustainability, it is unavoidable to not consider the working conditions on the construction site, which substantially influence the workers and employees. In general, during the discussion about the workers, the majority of interviewees put forth the Swedish law regarding the working conditions, which consider safety, no children on site, equality, taxes, and no human exploitation.

"Absolutely that's a (safety) demand, we put in requirements that they should work with a high quality 'arbetsmiljö', or they should be ISO14000 certificated…"

(Interviewee #2)

"Then we tried to make some controls during every project, making sure that the basic things are followed, people are not climbing up on high walls or roofs without the right safety equipment, etc."

(Interviewee #3)

"…all the workers should pay tax and so on… They should also work according to Swedish law when it comes to how many hours they work, and they should have this safety things that they need to do according to the law, and we also have chemicals that are forbidden because they are dangerous…we have of course no child should be working on our projects and so on…"

(Interviewee #5)

Another interviewee preferred to have long-term partners and make sure they follow '*kollektivavtal'* so they can trust them. But if new partnering is made, the interviewee claimed that they will have regular checks.

"Working conditions, we make sure that they have 'kollektivavtal' and that they follow it. And we usually have long term contracts with the contractors, so we make sure to have a contractor for at least three years, so we can do that kind of check once and then we can do our business for three or four years, but if we choose to add someone new, we always do those kinds of checks."

(Interviewee #3)

Few of them revealed that it is difficult to check the practice on site if there are too many subcontractors hired in the projects. To outsmart the lack of controllability, one interviewee conducts a careful review of the credibility of contractors on whether they follow the legislation or not.

"…it (whether they follow legislation or not) fades away. And not intentionally, but it's just very difficult to check."

"Well, safety, we do ask. Usually, the contractor is responsible for the working conditions outside and as part of the tender process we ask for what are their systems of applying a good and safe working place. So, they need to convince us that they've got a good system for that..."

(Interviewee #8)

To sum up, all the interviewees appear to seriously evaluate the obedience of contractors in following the Swedish legislation.

4.4 Theme III: Financial Aspects and Tendering Evaluation

The evaluation of the tenders is also an important aspect of the promotion of sustainable criteria. The way property developers fund their projects, but also the selection process the contractor to collaborate with, has a detrimental effect in the overall success of the sustainability goals that were set in the beginning. However, the property developers are called to find the right balance, while meeting the criteria they have prioritised. The optimal decision is influenced by the following factors:

- Financing
- LOU
- Multi-criteria Decision Making
- Experience.

Financing

Some of the interviewees mentioned that project's funding source may be green loans. These green loans are granted by the banks that set sustainability requirements and targets to the developers to guarantee a lower interest rate. Consequently, the decisions they are called to make are defined by the requirements that the banks define.

> *"You can borrow green money. So, what you pay to the bank, the loan and the interest is a little bit smaller, so that's one little benefit."*
>
> (Interviewee #1)

> *"We've got a lot of financing from the European Investment Bank, for example, and we've got a lot of green bonds… So essentially, a lot of our financing is sourced from that type of green financing if you want."*
>
> (Interviewee #8)

The structure of the company and the way they fund their projects may also affect the decisions they are called to make during the tendering evaluation. Although most of the interviewees agreed that they would be willing to pay for more sustainable solutions, this is most of the times chained with the necessity to be able to see the value that those sustainable solutions can return. Companies that aim to own the project after its production, seem to be able to invest more, since they aim for a turnover that will profit them in a longer time of period (Interviewee #1), while other companies invest in solutions that they can convince the future owners that they worth the price. Furthermore, they can invest more on sustainable solutions when they plan to sell more properties in the area and those sustainable solutions may increase the square meter value of the area (Interviewee #7). There are also companies that because of their structure do not aim on profit but affordability, hence allowing them to take more risks (Interviewee #3).

> *"We have to have rents that are not very high because people in [city] should be able to pay the rent and it's also that we of course have to deliver money at the end. But maybe other companies have 1 to 3 years before they start to get in money from the rents, we have like 8 years."*
>
> (Interviewee #1)

"When you build a new area, the impact always is that the area increases in value. So, it gets much more expensive to rent premises, because the area is getting nicer or more attractive. So, we have something that we call square meter value… A place on the ground floor that we want to have where an actor that cannot afford the higher rent because the area is becoming so expensive, we allow to pay less, because we think that they will give a lot to the area."

(Interviewee #7)

"The price is a big, big point and we need to keep our prices as low as possible... I don't want to pay overprice to contractors when that could be put to making a greater campus for our students. That's the main point."

(Interviewee #3)

Deciding the best offer is usually price defined and the greatest example is according to one interviewee a triangle that combines price, environment, quality, and time. Not everything can be at its maximum level and developers are called to balance between them and "stretching the triangle".

"You have this triangle. There's price, environment, quality, or time... In fact, you can stretch it, but you can't have everything correct. You always have to stand for the balance... We have our economy goals, and we have our environmental goals, so we have to find a way to find the balance between those."

(Interviewee #2)

"I would love to say that it's sustainability, but at the end of the day, it's also about price. So, I don't know a combination of them, I would say."

(Interviewee #5)

LOU

Regarding the tendering phase, the interviewees have numerous ways of evaluating the offers depending on the type of procurement they have. For instance, one interviewee emphasized their limitations on the evaluation process since the company is tied with the ownership by the municipality. Despite that limitability, the interviewee thought that it is a fair play for everyone because everyone can compete in the tendering process, and they still try to find new innovative ideas in the market that they can procure.

"It's called 'lag om offentlig upphandling', LOU. It's when you are owned by a municipal or the government. You have to connect to that one, because we have to set up this competitive procedure… Sometimes it's just the one with lowest money that is the winner, but often for us you can talk about environmental issues and things like that and then we prefer these."

"We have to follow the law in that, so we can't choose. And we meet the contractors quite a lot to hear what they are working with, so we can put it in our requests before, because if they leave it on bid, we can't give them points for that because we haven't asked for it."

"I think that's good because it's hard to work with LOU, but it gives everyone the chance, so I think it's good, but it's not so easy. Of course, it's nice to choose your friends that you know, but it's very good to meet new people."

(Interviewee #1)

Multi-criteria Decision Making

It is mentioned by Interviewee #8 that usually they evaluate, during the tendering process, by using a set of criteria. Most of the interviewees stated that when composing the criteria, they always strive for environmental requirements, however the affordability of each solution always defines the decision (Interviewee #7). Nevertheless, the cost defines the final decision, because there are strict lines in some respects, hence energy consumption or CO_2 emissions (Interviewee #4 and #6), that all tenderers have to meet to be considered in the tendering phase (Interviewee #8) and if they fail later to perform what was agreed then they will have to bear the consequences (Interviewee #6).

> *"We will evaluate against a set of 6,7,8 criteria and it's not necessarily point based. What we're saying is that we will evaluate it against those criteria and then we will award the contract to the one with the best."*
>
> (Interviewee #8)

> *"It's always price, quality, sustainability, and time. It's always in balance, so sometimes we can take the more expensive if we see that it's good for the global… You always have to think about the whole project. So, it's often not the cheapest one that is true, because you can have a big impact on the project if you choose one thing."*
>
> (Interviewee #7)

> *"It's not cost based. I mean it's going to cost, and the cost is always the deciding point in the end, as long as you feel secure about other parts as delivery time, and you think that their cooperation will be good and so on. But of course, if you have quite close cost level and you feel that they are less risk… then you might of course choose more secure partner."*

> *"We have our ambitions and how big emissions that are allowed, and we need to choose the supplier that can make us reach that target. So that will be of course one parameter, and if both alternatives will make us reach this target but one is even better, then I would say it depends on the product economy… So, since we're already have quite tough requirements…"*
>
> (Interviewee #4)

> *"We have the requirements and for example with the energy consumption where we're putting in the contract that you need to reach 75 kWh. And if they don't reach the requirements, it's the contractor's responsibility to investigate what went wrong and correct the problem."*
>
> (Interviewee #6)

Sometimes this evaluation can be executed with a point system that the property developer has defined, based on which areas they find more important.

> *"The goal is to have a point system. Some kind of point where you can see how much they score in different areas... It's more to get an overview and how it feels when it comes to sustainability, how much money they want."*
>
> (Interviewee #5)

Experience

Another crucial factor that defines this decision is how capable is the contractor, how good they communicate the knowledge they have to execute the project and the past experience they had with the property developer.

> *"We're not saying necessarily that the economical side is more important than the organisation or the organisation is not more important than the practical document of how they would go about. It's just the combined impression that this company is better than the others."*

(Interviewee #8)

> *"I'm not bound to choose the cheapest one, but usually when you ask five people, you will get one, that is way too cheap and they have missed something, somebody that is way too expensive, they want too much money for it. And you have three in the middle, which usually comes in about the same price. And from there we evaluate them on how well they have understood and read up on the project. So, we make sure that they just haven't guessed right. I want to make sure that they have understood the complexity that we demand from them and from there we go on and choose who we think is the best."*

(Interviewee #3)

The experience they have according to Interviewee #3 is not only limited in the number of years or projects. It may be related with the size of the projects they have dealt with or even if they have specific strengths or unique competences.

> *"It's based on my gut feeling for the project… So usually, if I have a bigger project, one million crowns or bigger, I usually ask two or three of our long-term partners and perhaps I ask one external just to make sure that I get a fair price and I prioritize them based on their different strengths, for instance I have a couple of them that I know it works fast, and then a couple of them that I know work great with if there are neighbouring offices…"*

(Interviewee #3)

Most of the interviewees stated that if they had an unpleasant experience with someone then it would be very unlikely that they would collaborate again.

> *"There are of course companies that we have stopped working with because we have realised that they are not a good partner, they don't share our values, or they cannot handle the projects in a good way."*

(Interviewee #4)

If they have no experience, then they usually prefer to "test" them in smaller projects where the risk is lower.

> *"Of course, if we know them from before and have good experience with them, then we take a discussion around that… If it's someone we have no clue about since before, then they wouldn't be in the round because we don't want to. We can test new ones on smaller things to get to know them. But in bigger projects, it's always companies we know that we can trust and so on."*

(Interviewee #5)

5 Analysis

This chapter presents an objective comparison of the findings that occurred during the literature review and the empirical study. The purpose is to discuss the points and arguments that coincide and those that differ and prove matchings and conflicts between theory and reality.

5.1 Theme I: Long-term perspective, Reputation and Responsibility

Views on long-term perspective

Long-term cost savings, as supported by Iles and Ryall (2009), seem to be one of the drivers that the interviewees proposed that encourages property developers to adopt sustainable criteria. Especially companies that their business model is based on owning the properties, invest more on sustainable solutions, since they can afford obtaining profit in a long-term perspective and not in the next few years. Renukappa, et al. (2016) mentioned that sustainability criteria might have a positive effect on the price, either by reducing costs or allowing property developers to sell at a higher price. This is also reflected in the interviews, since many property developers recognised the ability to save expenses on energy consumption by investing on more sustainable solutions, or sell certified buildings at a greater price, since this is valued by the market. As far as internal structures are concerned, companies that aim in the long-term perspective, appeared to invest in new roles related to sustainability, as proposed by Renukappa, et al. (2016).

Reputation and competition

The socio-economic pressures that Walker and Philips (2009) mentioned were also realised in the interviews. Many of the interviewees mentioned that the reputation of the company was important since tenants are not willing to buy apartments or offices that are not sustainable in some respects, but this statement could only be generalised in Sweden. These socio-economic pressures can also be identified in the pressures of the local society that one of the interviewees mentioned, but also the press influence that affects the public opinion, an issue recognised by Andrecka and Mitkidis (2017). Corporate social responsibility that Iles and Ryall (2016) mentioned appears to be of concern for property developers in Sweden and more specifically two of them stressed how important it is to communicate only realistic facts and accomplishments that they can promise they can achieve.

It is true that competition between companies promotes more sustainability criteria (Ruparathna and Hewage, 2015b), since many of the interviewees stated that in order to survive as a business, they have to keep up with what the rest of the sector is achieving and even trying to be pioneers in the solutions that they offer.

Responsibility

The essentiality of the property developer's initiative for sustainable requirements and criteria that Ruparathna and Hewage (2015a) described was also reflected in the interviews. All of the interviewees recognised their responsibility towards sustainability, either because this was seen as an ethical responsibility or because they recognised that there is a market that they can invest in, as Candel and Törnå (2021) proposed. Although, they agreed that the government has also some part of responsibility, they did not consider it as a driving force. In addition, their responsibility

was also recognised in comparison with that of the contractors, who are considered illegible for the promotion of sustainability in a greater extent.

Consequently, this comes in contrast with what Andrecka and Mitkidis (2017) proposed about companies having resistance in their structures, which impedes the implementation of sustainability criteria. It is assumed from the interviews that most of the Swedish companies are eager to implement sustainability and they understand the benefits of it. Nonetheless, the promotion of sustainability criteria is limited only from the cost aspect when clients feel that this will not ensure financial sustainability of the project.

The empirical findings seem to differ with the opinion of the literature on the topic of governmental regulations. According to Renukappa, et al. (2016) and Ruparathna and Hewage (2015b), the companies are implementing sustainability requirements since they are obliged by law. Nevertheless, all the interviewees identified that the Swedish regulations are yet behind what the companies can achieve and actually request, when it comes to sustainability and even identified that they are the ones setting the agenda. For some of the interviewees this is not considered negatively since, as they mentioned, all companies are allowed, regardless of their size, to obey the law and still promote some sustainability requirements. Only a few of the interviewees identified a need for stricter regulations, supporting that everyone can have improved performance in sustainability, but some companies aim in to maximise their profit by sacrificing sustainability. There were also proposals for stricter regulations towards the contractors' performance and their liability for failing to satisfy social sustainability criteria.

Candel and Törnå (2021) mentioned that each municipality might set their own requirements and specifications, which might prove to be an obstacle for property developers, since they have to adopt to each one of them. This was also recognised by the interviewees and one of them stated that it is important that there is a more national approach that will promote standardisation and lower the costs.

5.2 Theme II: Criteria on Sustainability

The future potential development on environmental sustainability

In the empirical results, the attentiveness of property developers on environmental sustainability is clearly revealed. One of the foremost goals claimed by most of the interviewees is executing climate neutral projects in around 8 to 18 years ahead. This finding is harmonious with the literature where Renukappa, et al. (2016) emphasized that CO_2 reduction emission is widely used as a requirement in the procurement. Moreover, being climate neutral, as the interviewees stated, is somehow connected with the European Commission goals on starting to be net-zero emission for all new buildings in 2030, then step by step reducing fossil fuels for heating and cooling until 2040, and eventually completely no emissions for buildings by 2050 (European Commission, 2019). Nevertheless, there is one contradiction that emerged from one interviewee, who expressed concerns not only about carbon emissions, but the whole perspective of sustainability.

The emergence of efforts towards sustainability undertaken by property developers through various ways. Those efforts involve either development of materials, reduction of energy, or even both of them, which is consistent with the theory delivered by Ruparathna and Hewage (2015b), who believed that stakeholders that maintain

enthusiasm for sustainability may draw their attention to sustainable requirements in the procurement phase, such as by requesting (sub)contractors to use sustainable materials and to lower energy consumption.

There is a harmonious relationship between the empirical findings and the literature about requesting specific materials. In detail, some property developers have specific requirements regarding the use of green materials and check its legality with the national database. Bonenberg (2017) declared that one type of requirements is the prescriptive character requirements, which are taking into account specific size, amount, and details of the solutions. Thus, it can be concluded that the interviews results are in line with the theory on the topic of materials.

At the same time, there is a concern on the availability and standards of green materials. Since, based on the empirical findings, the construction industry is currently experiencing a challenge to use low carbon emission materials. However, it is still an on-going effort that needs to be standardised further. This is also supported in the literature study where Kjerulf and Haugbølle (2021) stated that there is an urgency of standardisation for methods and tools in the construction industry to enhance sustainable solutions, that target property developers' sustainable requirements in the procurement process.

When talking about circular economy, many of the interviewees mentioned that they try to build with reused, recycled, certified, or durable materials. The practice in real life is in conjunction with Kjerulf and Haugbølle (2021) critics that proposed models for circular economy that usually orientate on the product, for instance by using reusable, recycled, or enduring products. Kjerulf and Haugbølle (2021) further elaborated that the circular business models need to be attuned to be suitable for the construction industry, by appraising the long-term considerations, including extensive lifecycle of capital goods (e.g., buildings, machinery, tools); adjustable design; specific product purchasing; and maintenance care throughout the building lifetime. There is one interviewee who claimed to have developed product-based mindset for the materials, which is also supported by Kjerulf and Haugbølle (2021), because by using long-lasting materials that have less maintenance and service costs throughout the lifecycle. This is not connected to the common circular economy models, which are defined by Kjerulf and Haugbølle (2021) as product-based circular models. Intriguingly, the same interviewee agreed about having an efficient design of the building for the sake of reducing energy consumption, disregarding though possibilities for circular economy.

In addition, Ruparathna and Hewage (2015b) explained that the energy consumption limitations during the construction and operational phase can emerge as one requirement from the clients. Some interviewees agreed to take energy consumption as their first priority. Especially, when it comes to the installation of solar panels, it is a more prominent priority than the one of CO_2 emissions.

When discussing about energy consumption, many interviewees are stimulated to reduce energy consumption by various ways, confirming the statement in the literature by Lazoroska and Palm (2019). Different efforts of property developers arose, such as reducing energy consumption from the limit of 85 kWh to 75 or 55 kWh and installing solar panels. The installation of solar panels is interpreted by Kanters, et al. (2013) as an active way to obtain solar energy. However, there is only a minor identification of acknowledgement of passive solar energy in the empirical study. The argument of Kanters, et al. (2013) regarding property developers using solar panels to attract the

attention of the public is not proved clearly in the empirical study, but the fact that the passive solar energy, hence ventilation and daylighting, is not a focus for the interviewees, might confirm the literature statement. The use of wind craft turbines was only expressed by one interviewee, compared to the solar panels that most of the interviewees discussed about. This empirical finding is implicitly contradicted with the statement by Dahlquist, et al. (2015) who explained that Swedish regulations focus more on wind power than solar power.

The use of district heating for their residential buildings is mentioned by one interviewee, but the interviewee claimed that most municipalities in Sweden have their own central heating, meaning that most electricity distribution run through the district heating, as criticised by Bulut (2015).

Bulut (2015) also uttered there is a severe issue between the building industry and the energy industry concerning self-generated electricity. This statement is not a hundred percent supported by the empirical findings, because one interviewee stated that they own wind craft turbines to generate electricity. However, still the same interviewee showed a mistrust to the energy industry, claiming that initiatives of sharing energy between buildings are perceived by the energy companies as a threat. All in all, the empirical findings are harmonious with the literature study by Lazoroska and Palm (2019) proposing that the property development industry strives towards lowering the energy consumption and constructing energy efficient buildings.

The result of the research by Sterner (2002) shows that waste separation and sustainable materials selection has spread among the Swedish contractors. However, to reuse materials, contractors certainly need approval by the clients. Thus, Sterner (2002) suggested that clients should put requirements for waste and circular economy management, during the early planning process. The empirical findings proved the statement by Sterner (2002) since many clients considered waste management and reusage of materials as a circular economy practice. In the demolition process, Sterner (2002) also argued that there is a high chance of products to be reused and recovered, which is also consistent with the interview results, that found few interviewees who command contractors to reuse some elements from the demolition for other projects and if not, then they should be recycled.

A comprehensive understanding of sustainability can be seen in the nature's value and efforts to preserve it, and not for the sake of money or human interest (Vos, 2007). This thick understanding is obtained by two interviewees who see the whole picture of balanced sustainability, particularly by only implementing reused materials, if it is the appropriate decision for the environment but also financially advantageous. This is also in line with the description of Renukappa, et al. (2016) on the extensive criteria, where the focus balances between technical, structural, socio-cultural, and human resources aspects.

The role of certification (BREEAM) on the circularity application is questionable, since one interviewee experienced a conflict on the BREEAM point system that evaluates negatively reusing materials in the point system. This obstacle on the point-based certification corresponds with the remarks of Turk, et al. (2018) on inappropriate use of point-based certifications (mainly BREEAM SE and LEED), whereupon the clients aim on the collection of small points from easy criteria to cover the lack of points from difficult criteria.

Tools and legislation in enhancing property developers to implement sustainability

The encouragement towards sustainability, as claimed by Chang, et al. (2015), depends on the governmental policy which addresses local issues. The loose sustainable governmental legislation generates undeveloped sustainable requirements in the construction industry, while many interviewees criticised that the new climate declaration by Boverket did not exert influence on their practices given that they have performed climate calculation in advance.

The argument of Walker and Philips (2009) regarding the crucial role of governmental regulations in driving the development of environmental technologies is disputed by the majority of interviewees who opined that the government regulation is lagging behind the industry. However, there is still one interviewee that mentioned that they are in the preparation process to apply climate calculations. The advantage of Boverket's new climate declaration has been debated by interviewees in the empirical study. The fact that Boverket's regulation does not request any specific requirements, pulls out concerns from the interviewees. Some interviewees believed that unrestricted regulation helps the introduction of the climate calculations' application in the industry, to make sure everyone is on board and in the same direction. This belief is in accordance with Boverket's (2020) intentions to reinforce the zero CO_2 emissions shift through materials' selection in the production phase.

The UN SDGs seemed not to be the main focus at the moment. The fact that the UN SDGs were held in 2012 might be the reason behind why the UN SDGs seem to be outdated. There is no literature referenced explicitly mentioning the connection between UN SDGs and the property development industry. The lack of attention by property developers in the empirical study might be caused because this unified goal has been transformed into more regional and national agendas, such as the Paris Agreement and the Boverket Climate Declaration. Nevertheless, there is one interviewee who admitted a deeper look, not only towards 17 SDGs, but also to 169 points below it. More or less, the property developers use UN SDGs as the guidelines of their business strategy and to communicate this strategy with the tenants in a comprehensive way.

The widely used tool among property developers is Life Cycle Assessment and certification. One function of the LCA tools is to assess products, elements, or whole buildings. Nevertheless, Sterner (2002) reckoned the LCA execution to lack of expansive analysis for the whole building over the lifecycle and Eriksen, et al. (2017) supported that LCA is defined by the difficulty in exploiting it in a wider spectrum. The interviews supported the arguments of Sterner (2002) and Eriksen, et al. (2017), since almost all of the interviewees carry out LCA only to compare between materials, designs, and methods. The discussion about the uncertainties in LCA and LCC assessment methods, reinforce the complexity of calculations resulting in inaccurate execution (Kjerulf and Haugbølle, 2021; Sterner, 2002). The empirical evidence claims indirectly the same opinion on the chance of miscalculation in the assessment since they tend to rely on specific personnel for consultancy. The accuracy and credibility of LCA is doubted because of its lack in data and high-degree complexity, as declared by Sterner (2002) and agreed by one interviewee. However, the interviewee has faith on the tool and tries to exploit the benefits at its most.

The trend to use certification as a tangible sustainable tool has risen among property developers, as indicated by Ruparathna and Hewage (2015b) who presented different choices of certification in the procurement phase, such as LEED (mostly used internationally) and BREEAM. Likewise, there are various certifications mentioned

during the interviews, consisting of BREEAM, LEED, Ecolabel, and Swedish certifications such as Miljöbyggnad.

According to Cole and Valdebenito (2013), Sweden developed a domestic certification called Miljöbyggnad, yet the property developers tend to choose international well-recognised certification. Under one condition, this statement is arguable by the fact that four interviewees (50%) do not request for specific certification, but rather build upon the building and the users' circumstances, while the other four interviewees (50%) choose specific certification, consisting of three clients that choose international certification (two BREEAM Excellent and one LEED Platinum) and only one choosing domestic certification (Miljöbyggnad Silver).

The vagueness of social sustainability

The literature and empirical study agreed in the struggle of quantifying social sustainability levels. An important argument emerged in the interviews, claiming that it is hard to cross-check if contractors or subcontractors really perform social sustainability requirements written in the contract and the fact that there is no tied up punishment, makes social sustainability practices neglected even more. This is also realised by Zuo, et al. (2012) and Eriksen, et al. (2017) who underlined the hardship of converting social sustainable assessment to numbers.

The discussion over social sustainability during most interviews is also touching upon the employment and training of students, out-of-work people, or immigrants. This illustrates that many property developers are considering employment efforts in their projects, which is in contrast with the perception of Ruparathna and Hewage (2015b) and Andrecka and Mitkidis (2017) who proposed that social employment is uncommon in the requirements. Presumably, to some degree, Ruparathna and Hewage (2015b) and Andrecka and Mitkidis (2017) may be true, because many interviewees mentioned that taking social employment into account when procuring a project is not a fixed request for every project. There are always tries that are not reflected in the literature study. For instance, two of the interviewees described their program to develop a facility for the society to explore and experience new things.

There are efforts, mentioned by the interviewees, to lower the noise and negative impact towards the city, by managing the logistic activities. There is no specific literature in this study that discussed logistics activities, however there is a specific comment by Sezer and Fredriksson (2021) about the room for advancement of logistics activities to mitigate the disturbance of the community when using LEED certification. Furthermore, it is inaccurate that the well-being conditions have not been considered at all by the clients, as stated by Ruparathna and Hewage (2015b), because in fact the property developers are trying their best to reduce noises regardless of the certification they use.

In the projects studied by Walker and Philips (2009), it was found that several clients set demands towards contractors to check the credibility of suppliers, not merely to the suppliers' certification, but also whether they provide a safe working environment and following labour rights. Nevertheless, most interviewees recognised the complexity to check every stakeholder (subcontractors/suppliers), since there is a long chain in each project. They manage to overrule this issue by checking the credibility of contractors and their systems. As suggested by Renukappa, et al. (2016), the clients usually apply social requirements that consider the working environment, discrimination, safety, labour hours and compensation, also proposed in ISO14001. All clients, in the

interviews, are fundamentally focusing on the obedience of contractors towards prevailing regulations either of the Swedish law, such as *'kollektivavtal', 'arbetsmiljö'*, or of international standards such as ISO14000.

5.3 Theme III: Financial Aspects and Tendering Evaluation

The interviewees agreed with the proposal of Yen, et al. (2015) that sustainable projects cannot be procured with traditional tendering evaluation systems, which are based on lower cost winner. Most of the interviewees mentioned that they prefer a multi-criteria evaluation system that balances price, quality, performance, and expertise, just as Nguyen, et al. (2018) suggested in the best-value tendering evaluation method. The experience of the contractors, according to the authors, was also seen as an essential factor by the interviewees, both as far as expertise on specific competence is concerned, but also the past positive or negative experience they have with them. Nevertheless, when the property developer is obliged to procure using "LOU", then the multi-criteria evaluation is more limited and past experience cannot be identified in that context, applying only price-based analysis evaluation.

The unbalanced tendering that Li, et al. (2021) described, was also noticed in the interviews. More specifically one interviewee suggested that when they find tenderers that have increased cost or unjustifiably decreased cost, they do not consider their offers, while they realise the unbalanced tendering by identifying the average cost from all tenderers or by requesting offers from new contractors.

The innovative methods that Ruparathna and Hewage (2015b) proposed for efficient sustainable driven procurement occurred to not currently have any sign of application in the Swedish market. The only type of collaboration before procurement is the partnering agreements that some interviewees used in complex projects, where they shared the risk with the contractor at an early stage.

As far as risk is concerned, some of the interviewees mentioned that there is an issue when a lot of actors are involved and especially when there are many subcontractors that also subcontract some of their processes. They mentioned that they find it hard to keep the control, if all those actors do not share the same sustainability responsibility, which was also suggested by Candel and Törnå (2021).

Half of the interviews admitted the use of criteria lists to examine the winner of the tender. It could also be interpreted as using the Evaluation Matrix Method since the property developers consider various attributes primarily technical, sustainable (i.e., energy, CO_2 emissions), and economical (price) criteria, while trying to find the balance, as explained by Ruparathna and Hewage (2014). This method can also be interpreted as TOPSIS analysis (Opricovic and Tzeng, 2004; Gupta and Nair, 2021). One interviewee also indicated the application of the CO_2 emissions basis method, based on ISO (2011), because the property developers assess the offers by how many carbon emissions will be produced. The quantification of criteria through a point-based system is used by one property developer. Importantly, the Qualitative Judgments Method (Ruparathna and Hewage, 2014), is also being used by some interviewees where the contractors/subcontractors are appraised by their track record of dealing with three pillars of sustainability works. Not to mention, most interviewees agreed that in the end, the price is the final key to the decision of the winner.

6 Discussion

In the beginning of Chapter 4, it was explained how the main findings were categorized into group, subthemes, and eventually themes. In order to understand how the research questions can be answered, the subthemes identified in Chapter 4 are matched with the suitable research questions. From the matching results between 6 subthemes and the 4 research questions, the discussion can be further developed. In this chapter, the discussion is conducted by connecting the research findings and the research questions, also extensive to the presentation of the authors' idea and commentary views are provided.

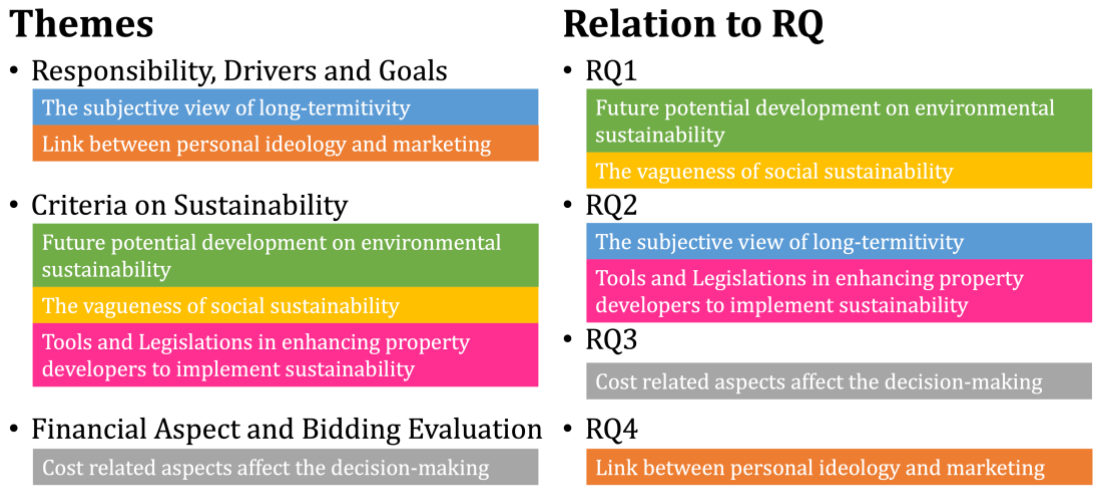

Figure 6.1 Grouping into main themes and matching with the research questions.

6.1 RQ1: Incentives that drive property developers

What are the incentives that drive property developers in Sweden to adopt criteria for sustainability?

6.1.1 Market Driven

This study proved that sustainability requirements are not considered as a burden in Sweden, but rather as challenges they have to overcome in the most optimum way. This is a result of the demand caused in the market by the public. The Swedish citizens are aware of sustainability issues, recognise the need to live and work in buildings that do not harm the environment and the society, and are willing to pay for this. If the public was not interested in the sustainability issues, then there would be no demand in the market and property developers would not develop sustainable solutions, since it would be very difficult to sell them in this market context. In other words, the public gives value to sustainable solutions and this pushes property developers to chase that value to achieve greater profits.

This is also reflected in the fact that the Swedish government does not set strict requirements towards sustainability. The market seems to drive property developers to become better in sustainability, thus driving the agenda to be able to survive in the competition. It is proved that most of the big property developers already meet the requirements set by the government and usually are the ones advising the government

on how to develop those requirements. Consequently, time is gained for the smaller companies to adjust in those circumstances and survive, but at the same time setting regulations is becoming essential to construct a fair market that would not threaten small businesses that try to increase sustainability, while the small competitors do not act the same way. Simultaneously, the Swedish model, which is driven by the public demand, raises questions on whether this is the case in other European countries and if property developers also evaluate the tenders by multi-criteria method or based on the tender price offer.

6.1.2 Long-term Perspective

To understand how property developers establish these criteria and requirements, it is essential to understand the strategy that each company has obtained. This study recognised two primary strategy schemes for property developers, dividing them to those that aim to own the property after the production phase and those that sell the property. This of course has a considerable impact on the way property developers set their sustainability criteria, since it affects the spectrum of the lifecycle they take into consideration.

Property developers that keep owning the property consider how they can maintain the value of it in a more long-term perspective, since the financial viability of their business depends on that. If the property loses its value, then it has as a consequence the reduction of the profit that the business will make, which can either be translated as a failure in return of the investment or failure in increasing the company's profits and further investments. Thus, the sustainable criteria are developed under the perspective that in the future changes will happen in the legislation or also in which are the demands of the people, developing properties either by already meeting those criteria or by providing the basis to adjust in potential new criteria implementation. The energy crisis that stroked in Europe during 2022 foretells that in the future there will be an increased demand for buildings that will have reduced energy consumption, which means that tenants will be eager to pay more for such an investment if they know that this will save them funds from energy expenses. Therefore, there will be even more challenges in the future for new sustainability standards, that if the property developers have already predicted they can increase the value of their property and in sequence their profits.

Likewise, property developers, that sell the property after its development, might recognise this market demand, and implement more sustainable criteria regarding the energy consumption of the buildings. Nevertheless, this could be interpreted as a process that is only affected by short-term changes in the demand. In fact, they cannot accumulate profit for buildings that for instance have reduced energy consumption and are already sold. In addition, it is very risky to invest in other aspects of sustainability that are not currently recognised by the market as important, thus not gaining any value. Consequently, the investments in sustainability attributes for this type of property developers, regard only attributes that are currently distinguished as valuable by the public and the market.

This raises a debate on the way property developers define long-term perspective. Most of the interviewees mentioned that their companies focus on a long-term perspective. It is true that the implementation of sustainability criteria proposes investments that aim on benefits that last during the whole lifecycle of the building or even are realised in a later time by the tenants. Nonetheless, the long-term and short-term perspective should be defined by the timeframe that the client aims to pay off the investment and achieve profit. Therefore, companies, that have long-term perspective, are those that are

proactive, understand the whole lifecycle of the building and evaluate their decisions on how they affect their profitability in the future and how they might affect their decision-making and other challenges. On the contrary, short-term perspective should refer to companies that target a quick return of their investment. By no means this should be interpreted as two categories of companies, where one involves those implementing sustainable criteria and the other those that do not implement. On the contrary, it should be identified as a differentiation on the extent of the sustainable criteria they implement and the incentives that drive them.

This could also be reflected to the time they take to process their decisions and investigate the various solutions and their effect in the long run. This procedure is usually timely, thus costly, so only companies that own the buildings can afford this thorough investigation that would return a higher profit which would be accumulated in a longer time period. The structure of the companies either allows this since they have sufficient funds to survive until the costs are covered or are dependent on the accumulation of fast profit, thus selling the properties and investing the profit in new projects.

The "level of sustainability" should definitely be linked with the size of the company. Bigger companies have more funds to invest, but also more experience and better structures to support the investigation of more sustainable solutions. On the other hand, smaller companies, because of the limited personnel, cannot devote substantial time to investigate new solutions, thus their efforts may be limited although the policies and intentions exist in those businesses.

More incentives for the implementation of sustainability could be provided to property developers when they have a greater strategic plan for an area or decide to invest on a specific area. In this way, they can understand better the benefits they can gain from sustainability and specifically implement more initiatives towards social sustainability. It could be argued that they have a more holistic approach, aiming to increase the value with a broader perspective, but also recognising the needs of the tenants during the whole lifecycle. Consequently, the wellbeing of the society is discussed more when they want to have an impact in the area, although this might not be reflected in the procurement.

6.1.3 Communication & Reputation

Despite the fact that sustainability implementation is market driven, the property developers appeared to limit their communication of sustainable practices. The property developers seem to understand that providing sustainable solutions brings value to their projects, since their demand is increasing more and more by the public. However, the interviews unveiled concerns on the scale they communicate their sustainability achievements. It would be expected that the companies would do everything possible to advertise what they have achieved and create high expectations to the public about their future projects, since this will give more value to their projects and thus more profit. It could be though a more secure approach, as one of the interviewees mentioned, to not disappoint the future tenants and create illusions that would only harm the name of the company. Nevertheless, there should be a more sophisticated approach in the communication aspect to also sensitise even more the public on sustainability issues, by proving them what has been achieved.

6.1.4 Tools

An obstacle that property developers have to face to increase the sustainability implementation is the fact that the tools they use have not reached the reliability levels they would prefer. This could be linked also with the measurement issues that they might have in different aspects of sustainability and most importantly in the social sustainability pillar. Those issues create uncertainty and risk for property developers and consequently are factors that pull the brake in sustainable development.

Those issues have definitely an impact on the increase of sustainable criteria, and this is reflected by the fact that property developers seem to be more concerned about the environmental sustainability pillar. In particular, the interviews illustrated this tendency, although all of the interviewees recognised the division of sustainability into three pillars, mentioning that their approach is coming from a holistic perspective of sustainability. It could be predicted that in the coming years the focus will turn to social sustainability and how companies may become better in that aspect.

Nonetheless, property developers should become more efficient in the environmental criteria they develop, although they have an increased focus already. This increased focus could be explained that the knowledge has increased extensively in those topics or by the fact that the Swedish government has set the target to be climate neutral by 2045, which could be initiated by the will of the public. However, topics like circular economy are still new and property developers should investigate how circularity can become more efficient and actually assist in the environmental sustainability goals. In addition, LCA analysis seems to be a widely used tool but has not reached the reliability levels that the property developers would expect.

6.1.5 Responsibility

In fact, the government has a high increased role and responsibility in those terms. First and foremost, it should create a fair competition market and that may be translated in stricter regulations, since as an interviewee mentioned, the knowledge exists, the tenants can afford sustainable solutions, thus everyone should promote sustainable practices. The need is not only in regulations, but to also provide sufficient guidelines on how to adopt tools and use them. The government is the one that has the power to develop such guidelines, since it has access to a wide variety of information and can discuss with all stakeholders.

6.2 RQ2: Sustainable Criteria

How are the sustainable criteria reflected in the procurement stage?

In the procurement stage, property developers mainly follow the requirements from the government and set their own sustainable criteria when tendering projects. It is evident that the sustainable criteria focus mainly on environmental and economic aspects, rather than the social ones. From the empirical study, it is indicated that social sustainability is often set aside because of its intangibility and vagueness to measure, while lacking stimulation from the governmental legislation.

Principally, the property developers develop their sustainable criteria in the procurement phase by following the market demands. The high attentiveness of the Swedish public towards sustainable development gives considerable contribution to the implementation of sustainability in the property development sector. The proof is that the majority of property developers' requests criteria are namely certification, LCA calculation, green materials, affordability, safety, and working conditions.

6.2.1 Environmental Criteria

In most cases, the environmental criteria are represented by property developers through certification and Life Cycle Assessment (LCA). From the empirical study, a different range of certifications are mentioned, hence BREEAM, LEED, Ecolabel, and even Swedish certification systems like Miljöbyggnad. There is no indication of a tendency to use a certain type of certification, but it is dependent on the needs of the potential tenants/buyers, the type of building, the certifications' popularity, and the familiarity with the certification systems.

For instance, apartment buildings will idolise the tenants' attentiveness, hereby the property developers choose the certification that tenants are accustomed with. The apartment buildings are usually rent or sold to individuals rather than organisations. Thus, the certification becomes a tool to connect with every individual and promote the apartments' facility in terms of sustainability, such as low energy consumption. In addition, when property developers own the apartment buildings and renting it out, they do one's utmost to lower the operational costs in the long-term.

In contrast, office buildings might strive for more global certification by virtue of the users that are companies who appraise branding image. Moreover, office buildings are meant for organisations to run their businesses which have high sustainability stimuli, being very dependent on the clients' impression. Consequently, the reputable certification renders have a positive influence on the trademark of the tenants' organisations.

In other words, property developers aim for the best-value certification with higher standards, such as BREEAM Excellent and LEED Platinum. Further, their environmental concerns are not restricted to the certification, since they could be extended to the usage of durable materials with low maintenance, installation of solar panels, and development of self-wind craft jet turbines. With all the sustainable attributes which become a tool in terms of value-adding aspects to the property, property developers have the possibility to offer higher rent or price for the tenants.

Unfortunately, the existing certification systems are somehow problematic. The coverage of sustainability aspects in the certification systems is incomprehensive and distributed unevenly considering that the point-based system used to evaluate the level of sustainability leaves a room for fraud, with the possibility of users collecting points from simple criteria rather than points from complex criteria.

On top of that, the attitude of property developers in this study regarding circular economy is positive, but admittedly the point-based certifications affect the circularity practices negatively. Circularity such as reusing and recycling has not been incorporated with BREEAM certification, and on several occasions has left property developers in a dilemma between circularity or certification. Thus, property developers are reluctant to opt for circularity over certification.

Repeatedly, the certification deemed prominent despite its incomprehensiveness. The use of sustainable certification is not limited to assessing the sustainability levels but becoming an emblem for business purposes. Therefore, there is a need for further development of certification. The epicentre of sustainability is changing over time and surely the certification systems are bound to adapt with the transforming circumstances.

The like-mindedness about reducing CO_2 emissions is denoted among property developers. This ambition is reflected in their goals of reducing a certain percentage of carbon emission and then proceeding in the procurement phase by requesting lower

carbon emissions materials from contractors and suppliers. In realisation, some property developers request a specific level of certification of materials from suppliers, even though their availability might be very limited, and the price could be higher in contrast with the non-green materials. The ambitious goal of the Swedish government to be net-zero carbon emissions by 2045 has encouraged the CO_2 reduction by property developers. Property developers indeed support the governmental goal, whereas the public attention towards sustainability goals gives a significant contribution.

In order to know the environmental impacts of construction projects, namely carbon emission and energy consumption, property developers utilise Life Cycle Assessment (LCA). The new climate declaration by Boverket prevails since 1st January of 2022 seemed to possess minor influence on the LCA implementation due to the fact that property developers are ahead of the legislation. The factor which might influence the headway of property developers is the size of the company. To compose an applicable regulation, the government must seek advice and opinion of what is going on in the industry and what can stimulate the development of sustainability. The foremost construction property developers and contractors with wider networks have the primary opportunity to give counsel to the government.

Despite the leading position of LCA use, property developers limit the use of LCA for solutions comparison regarding materials or method of working. The use of LCA for the whole lifecycle of the building is unidentified in the empirical study, possibly because the complexity to calculate all of the projects' components and the deficiency of data provided in the software. In addition, the absence of no demolition activity is considered by the property developers, recognising the limited LCA implementation.

6.2.2 Social Criteria

Regarding social sustainability, property developers clearly declared their concern towards working conditions, safety, and the obedience of contractors/subcontractors to the Swedish labour regulations, such as *"kollektivavtal"*. Property developers have positively welcomed social sustainability, although those social aspects are often put aside due to various factors. The intangibility of social sustainability establishes a difficulty to request social sustainability requirements in the procurement phase. For instance, requirements on safety are hard to monitor on the construction site. There are only few developers that build facilities to support the community development and only minor indications of socio-economic concerns that accentuate the abandonment of social sustainability.

The decreased focus on social sustainability might be the outcome of the low stimulation for social sustainability achievement. Compared to the environmental criteria, property developers have the possibility to utilise certification to achieve environmental sustainability and the use of certification might affect their business directly. However, it is a different case for social sustainability, which has not been targeted sufficiently by any type of certification. In addition, property developers gain less direct benefits for implementing social sustainability, such as employing local subcontractors or building a facility for the community. Property developers have the intention to build a safe area surrounding the buildings, but it is a bit vague whether it is for the sake of social sustainability or the increase of the property's value. As admitted by one of the interviewees, the companies try to make a specific area more alive and investigate on how to overcome the challenges of that area, targeting to increase the socio-economic activities surrounding and the attractiveness of their property.

6.2.3 Economic Criteria

The scope of the study covering private property developers lead to the assumption that the companies are well-established financially since the companies need to have sufficient funds to survive in the industry. Hence, the economic sustainability aspects of the company have been internally predefined. Nevertheless, property developers, when choosing the tender offers, always consider all aspects of sustainability, but in the end the price is still a decisive factor. Furthermore, there is an indication of companies that specifically build apartment buildings which optimize attributes and affordability for the tenants. Affordability plays a major role in creating equilibrium in the urban planning, so that there is no cluster of exclusiveness or a two-dimension society.

There is a correlation between economic sustainability and certification. If the higher level of certification is used in the project, it will increase the cost of production, making the property more exclusive than those that have a lower level of certification. By this means, the renting or selling price will be escalated as well and it could threaten the affordability of the product, leading to economically unsustainable conditions.

6.3 RQ3: Tender Evaluation regarding Sustainability

How do the property developers in Sweden evaluate tenders offered by contractors regarding sustainability aspects?

6.3.1 The Multi-criteria Evaluation

The property developers from the empirical study displayed an increased adaptation of the best-value method to evaluate tenders. Sustainability consists of three pillars, economic, environmental, and social, on which all aspects need to be considered during the tender evaluation. The need to apply sustainability comprehensively has pushed property developers to demand a set of sustainable criteria for the contractors/subcontractors. Hence, the tender offers are evaluated through multi-criteria-based evaluation. Multicriteria-based evaluation allows clients to examine the offers by weighing each criterion they have developed and considering the best-value offer. In essence, best-value analysis or *"The Value for Money Analysis"* (Ruparathna and Hewage, 2014) are extensively utilised by reasoning its possibility to make the most of both price and sustainability criteria, by finding the best offer among others. This illustrates that the property developers want to get the best out of the money they will invest, while still achieving the sustainability targets.

Choosing the best-value can be interpreted as a hesitation of the property developers to take the risk and invest more money into a higher level of sustainability. For instance, the environmental and economic sustainability targets are of course prominent aspects of the criteria, and since their benefits are recognised, property developers are willing to invest for them. On the contrary, social sustainability benefits seem to not have been realised, especially those that have an indirect influence on property developers. That being so, social sustainability is less noticed when clients' conducting their criteria.

6.3.2 Experience Evaluation

The sustainable works on construction projects are reliant on the experience and familiarity of the contractors in doing sustainable projects, which then preside property developers to examine their previous experiences and track record of the contractors or presumed as *"The Qualitative Judgments Method"* (Ruparathna and Hewage, 2014). That being the case, the contractors need to prove their ability of working in sustainable

projects. However, this evaluation depends on the experience and creates obstacles for inexperienced contractors. Therefore, the evaluation based on experiences might only be appropriate for complex projects, and simpler projects could be an opportunity for smaller contractors to learn and develop their knowledge.

Another issue raised is how they can achieve the balance between the different parameters. Property developers are called to decide between price, but also other aspects, hence quality, whether the solution is related with high or low CO_2 emissions. In additions the energy consumption targets and the long-term perspective of the project should not be risked, while trying to reuse materials that demand experienced knowledge, promoting new job opportunities and considering their effect on the society. All these constructs a complicated puzzle that the property developers are called to solve and achieve the golden ratio. Apparently, this is not an easy task, and each property developer defines their own priorities. Nevertheless, it could be the case that in the future the respective knowledge advances and the solutions become more efficient, resulting to the simplification of such decisions.

6.4 RQ4: Clients' Expectations on Contractors

What are the Swedish property developers' expectations, as the clients, on contractors regarding responsibility for sustainability?

6.4.1 Limitations of Contractors

The property developers appear to have high expectations from the contractors and the subcontractors in terms of sustainability. However, they recognise that contractors have limited potential in terms of funding and consequently any initiative for sustainability should be driven by the property developers. Another reason supporting the limitations of the contractors, is the fact that they are poor in terms of ideas, as the interviewees claimed, and maybe this is a result of the conservatism and fragmentation of the construction sector, thereby allowing the limited capabilities of evolving the way they work. Therefore, the property developers are those supposed to fund innovative ideas and make decisions and discussions on how to improve the sustainability efficiency. The question is whether the contractors could do more, especially when the hierarchy of the projects in the construction sector, place in the top the owner/user of the project, then the property developers and consultants and lastly the contractors. It is the property developers that take the decisions, that should be accepted by the owner (when renting buildings this acceptance is translated by the demand of the market), and it is the property developers that make the funding decisions of the projects. Nevertheless, the contractors should collaborate with property developers by providing them with alternatives and considering how they can improve each process.

The expectations of property developers are limited in following what they required and agreed. They wish that the contractors follow the law and provide good working conditions and a safe environment for their workers. It is highly expected from them to perform well in these aspects, and not need to spend funds for supervising and performing checks on matters of safety and working conditions. Property developers are extremely dependent on trust with the contractors in those terms. The underlying reason is that they face issues in holding accountable contractors that fail to meet the standards they request in the conditions' aspects unless something extreme occurs. As a result, they are based on the good will of their stakeholders.

Likewise, they deal with issues regarding offering job opportunities following the same principles. They expect the contractors to offer new job opportunities to young people

and unemployed, as they agreed on the contract. However, they are not willing to follow any legal consequences if they fail to do so, since this requires a lot of funds and delays that they try to avoid if the contractor successfully performs sufficiently in all the other terms. Therefore, the contractor must share the same values as the property developers, to understand the essence of performing good on social sustainability requirements.

6.4.2 Chain Reactions

These standard practices should not only be limited to the contractors, but also to the subcontractors. The contractors should understand their responsibility on social sustainability and pursue to transmit this essence of responsibility to the rest of the stakeholder chain, hence the other subcontractors and suppliers. This means that they have also to perform checks and investigate if the other stakeholders possess the same ethics and sustainability principles. Reputation plays a vital role in these aspects. Since property developers cannot overcheck every aspect of the project, and they are based at a great extent to the reputation that the different stakeholders have in the market and the past experiences they had with them. Consequently, contractors and subcontractors should invest more on building a good reputation on sustainability and successfully deliver solutions and results as they promised.

6.4.3 Innovation

Furthermore, the property developers are seeking new innovative ideas and want to collaborate with contractors on how to develop them. Nonetheless, they are very concerned about how this affects they are budgeting and prefer to discuss with contractors how they can become better, while keeping the budget at the same levels. Opportunities for contractors to investigate new processes appear when property developers develop projects that have extended budget and are supported by the owners to introduce innovative methods, although these are limited occasions. In this regard, the contractor should always propose ideas and investigate future advancements, which could improve their reputation in the market, setting them as pioneers.

6.4.4 Contract Type Influence

It could be argued that the expectations of property developers to contractors are formed in that way because of the contract type. The interviewees mentioned that most of the times they prefer to use Design Build contract (“totalentreprenad”) in most of the projects, which shifts the whole responsibility to the contractors for meeting the sustainable requirements and reaching the requested levels. Therefore, the type of the contract forms this type of responsibility and these types of expectations from the property developers to the contractors. As a consequence, the contractors try to meet those criteria and the property developer assesses if they are satisfied from the results. In case they fail they can request to improve and if there are disagreements, they could go through a lawsuit. This raises questions on how they can improve their processes and offer better and optimal sustainable solutions. Partnering types of collaboration, as mentioned in the interviews for complex projects, could be a way to overcome this and assist property developers and contractors to work more efficiently and deliver better results regarding sustainability. However, they share risk and usually this type of cooperation might be translated to increased costs and that is how the interviewees justified that they preferred to use it only in complex projects, although it seems that sustainability targets may be better facilitated in those circumstances.

6.4.5 Feedback

Surprisingly, the interviews identified that property developers do not ask for feedback from contractors regarding carbon emissions. The reliability of LCA calculations has been questioned in this study, based on the arguments of both the literature and the interviewees. Thus, it would be considered wise if property developers invested some time in improving the LCA tools by investigating how to make their data more reliable. One solution to this could be if they requested feedback from the contractors about more realistic data that will occur after the completion of the project. However, the interviews proved that this is not the case since none of the interviewees expressed the notion of requesting such tasks.

7 Conclusion

The main goal of the current study was to investigate the viewpoint of Swedish property developers towards sustainable procurement, likewise their practices and drivers. The major finding in this research was the evidence of market-driven business possessed by Swedish property developers. The sustainability goals are on the agenda of Swedish property developers and significantly influenced by the attentiveness and demand of the market regarding sustainability. All three pillars of sustainability have been involved in the sustainability agenda of property developers, although this is disproportionately appraised. Property developers are also aware of the great responsibility that lies on their shoulders to enhance sustainable development. Nevertheless, the study indicates the government's role in stimulating the sustainable development, in which in this case is valued as poor regarding the regulation that is mainly driven by the construction industry. This implies that the role of property developers in sustainable development is paramount.

RQ1: *What are the incentives that drive property developers in Sweden to adopt criteria for sustainability?*

This study has identified that the main driver for property developers is the market. The public, meaning residents of Sweden, has great concern on sustainability issues and this is translated to demand for construction solutions that will meet the goals of sustainability. This demand is directly related to increased value in sustainable solutions that the property developers wish to exploit. Therefore, they are called to satisfy the market demand, while adapting their processes in the most optimal and sustainable way.

This research has also shown that another valuable aspect for property developers is reputation. Property developers that develop sustainable solutions efficiently and responsibly, successfully achieve to build trust with their customers and create a positive image of their company. This trust and good reputation could be also translated in monetary value on the projects they develop. Nevertheless, the reputation aspect might have an opposite effect since the market expresses its demand for sustainability. Thus, companies that fail to perform that way, might gather a negative reputation and detachment from the public and consequently risk their evolution and survival.

The effort that property developers invest is closely related to the long-term perspective that they have developed. This study confirmed that to develop sustainable solutions, property developers should have long-term thinking, something that seems to have prevailed across the market. This long-term perspective affects the way property developers set sustainable criteria. Nonetheless, there are different perceptions of the long-term perspectives, deriving from the strategy of the company to rent or sell the property. A more thorough investigation is given when the property developers understand that they have to preserve the value of the property for the whole lifetime.

RQ2: *How are the sustainable criteria reflected in the procurement stage?*

The results of this investigation show that property developers have applied sustainable criteria in their procurement, despite the different levels of implementation. Although the criteria are multifarious, there is an indication that the social criteria are being underdeveloped in comparison with the environmental and economic criteria.

The study has identified that the prime focus of property developers in the environmental aspects is reflected through the certification, LCA, energy consumption, and CO_2 emissions reduction. Undeniably, the shaft on environmental criteria is

magnified by the governmental target on being climate neutral shortly, which became a stimulus to implement environmental criteria. Regarding the economic perspectives, property developers contemplate the affordability of the product which might have the connection with the attractions of the future tenants. Social criteria seemed to have the least focus, where their implementation is limited in only following the prevailing regulations about safety, labour rights, and working conditions. The issue concerning the intangibility of social criteria can be one factor to its minimum implementation, exacerbated with low level of stimulation by the government.

RQ3: *How do the property developers in Sweden evaluate tenders offered by contractors regarding sustainability aspects?*

This study has found that generally property developers evaluate tender offers by utilising multi-criteria evaluation, where the criteria are weighed based on the vision and mission of the company towards sustainability. Moreover, the best-value offer emerged to be prevalently preferred among the property developers, even though the experience of the contractors could sometimes affect this decision.

RQ4: *What are the Swedish property developers' expectations, as the clients, on contractors regarding responsibility for sustainability?*

The Swedish property developers seem to have limited expectations on the contractors, especially in terms of initiatives. The property developers recognise their responsibility to drive the sustainability agenda, while understanding that contractors have limited capabilities of funding new ideas and investing in sustainability. However, they are dependent on the trust they build with them and expect the contractors to perform what has been agreed. The most important issue though is related to the expectation that contractors should share the same principles and responsibility. It is a crucial issue when a lot of subcontractors are involved, since the contractor should promote the sustainability standards and responsibility to the rest of the chain of stakeholders and perform checks on whether they comply with those standards.

Last but not least, this study identified the calls of property developers to the contractors for more innovative ideas and new efficient solutions. They are willing to discuss with them how to increase their benefits by improving their processes and how to fund those ideas. Consequently, innovation can be only achieved when both the property developers collaborate closely together and share the risk, which could be limited by the type of contract and collaboration they currently have, proposing partnering contracts as more optimal forms of collaboration in the future.

One of the most significant findings to emerge from this study is that the sustainable practices and the implementation of sustainable criteria by property developers are market-driven. The demand that is caused by the Swedish society motivates property developers to implement sustainability and strive to become pioneers in this context. The market, as the driver, can be the solution to the negligence of social sustainability. If the public understands the significance of social sustainability, they will shift their interest to those criteria as well. Therefore, property developers would be forced to adapt in those circumstances and satisfy this new demand, which will cause a chain reaction in the formulation of new tools and regulations. Nevertheless, a vital question is raised here, whether in another context, where the market is not that sensitised in sustainability matters, what are the drivers that promote the implementation of sustainability in the construction sector?

Future Studies

The findings will be of interest to studies that aim to expand the implementation of sustainability, especially in terms of the three sustainability pillars. It also assists on the identification of the fundamental challenges that are related to sustainability implementation and pinpoint areas that could be improved. The study also provides constructive criticism towards the property development business and the governmental initiatives.

Consequently, bearing in mind that this study focused on the reality of the Swedish property development sector, notwithstanding these limitations the study suggests that more in depth investigation could be performed in the following areas:

- A broader scope involving other European countries to identify similar or different patterns in other markets.
- Possibilities to improve the current tools and measurement methods of social sustainability and its requirements that are derived.
- Variations on the perspective of the governmental approach in the matter of sustainable development in the construction industry.
- Explanation of the perception that contractors obtain on their responsibility on sustainable practices and their implications as well as their influence on subcontractors.

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