CHALMERS
UNIVERSITY OF TECHNOLOGY

What is a bumble bee worth?

How to manage green investments to create and capture sustainable value in Swedish AEC organizations

Master's thesis in Design and Construction Project Management

ELSA HÄRNSTRÖM

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF SERVICE MANAGEMENT AND LOGISTICS

CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2023
www.chalmers.se
Report No. E2022:094

REPORT NO. E2023:094

What is a bumble bee worth?

How to manage green investments to create and capture sustainable value in Swedish AEC organizations

ELSA HÄRNSTRÖM

Department of Technology Management and Economics
Division of Service Management and Logistics
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2023

What is a bumble bee worth?
How to manage green investments to create and capture sustainable value in Swedish AEC organizations
ELSA HÄRNSTRÖM

Report no. E2023:094
Department of Technology Management and Economics
Chalmers University of Technology
SE-412 96 Gothenburg
Sweden
Telephone + 46 (0)31-772 1000

Gothenburg, Sweden 2023

We can no longer claim ignorance, or innocence. None of us stands outside of the circle of responsibility. Together, we can begin to explore how collaborative, self-organizing leadership can generate innovative and sustainable solutions, and wiser investments, for a more sustainable world.

M.A. Ferdig, (2007)

ACKNOWLEDGEMENTS

Firstly, I would like to express my gratitude to my supervisor, professor Pernilla Gluch at Chalmers University of Technology for your most valuable guidance and support. I would also like to thank my opponents, and dear friends, for your valuable and encouraging feedback. Thirdly, I would like to thank my case company for having me this spring, letting me occupy one of your desks, and for sharing your inspirational thoughts about sustainability in the AEC sector. Lastly, thanks to my friends and family for your support during this process.

What is a bumble bee worth?
How to manage green investments to create and capture sustainable value in Swedish AEC organizations

ELSA HÄRNSTRÖM

Department of Technology Management and Economics
Chalmers University of Technology

ABSTRACT

Due to the shift among capital actors and the implementation of the EU Taxonomy, sustainability and finance is getting increasingly linked, and green investments has been identified as an enabler to change the EU economy. Consequently, companies in the Architecture, Engineering, and Construction (AEC) industry will need to transform their businesses to align with the changing environment. This thesis aims at investigating green investments and their impact on the AEC business environment, and how the future benefits of green investments better can be managed, valued, and motivated by an architecture and engineering consultancy firm. To reach the aim, a qualitative research strategy with an inductive reasoning was applied, and the study consist of a literature study, qualitative interviews, and a case study. According to this study, the main incentives to why construction companies make green investments are due to stakeholder pressure. Further, it could be identified how green investments will increase the demand for green services. In order to manage green investment and sustainability, environmental competences and capabilities are essential, and both intra-and interorganizational collaboration appear to be of high value. Green investments have the potential to transform the AEC sector, because 'not being green' should be considered a business risk.

Keywords: Green investments, green services, the EU Taxonomy, sustainable business models, construction, the AEC sector, environmental competences, environmental capabilities, ACAP, the sustainability transition, sustainable transformation, green construction

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

What a bumble bee is worth? This can be argued to be a tricky question, since it traditionally has been, and still are, hard to prove economic benefits of investments in initiatives strengthening environmental sustainability. Managing sustainability from a business perspective may be viewed as a *wicked problem* (Brønn & Brønn, 2019). A wicked problem has no definitive formulation, due to multi-stakeholder involvement with different objectives and values. Further, it has no stopping rule and is also a result or a symptom of another problem. Consequently, wicked problems have no 'best solutions' and will most certainly result in other challenges, due to their undetermined time horizon and dynamic nature; they change over time. As a result, Brønn and Brønn (2019) argue that organizations no longer can only adapt to the current landscape, nor rely on forecasts based on present situations. Rather, they need to optimize their business, hence, know how to develop "business strategies for the economic dimension that are compatible with the needs, constraints and goals of the social and ecological dimensions" (Ibid, p.8).

According to McKinsey & Company (2021), sustainability, growth and inclusion will need to be the main drivers behind economic prosperity in the future. Consequently, both public and private capital flows need to move towards sustainable finance, pushing towards more circular, neutral, and resource- and energy-efficient projects (EU Technical expert group on sustainable finance, 2020). As part of the Green Deal, the EU Taxonomy for sustainable activities has been implemented as a tool to support the sustainability transition of the Union. The purpose of the EU Taxonomy is to provide policymakers, companies, and investors with a definition and a system of how to classify the environmental sustainability of economic investments. Thus, it will enable the identification of 'green' economic activities, in other words, economic activities that are 'environmentally sustainable', and make a "substantial contribution to at least one of the EU's climate and environmental objectives" (European Commission, n.d.-a, p. 1). One of the industries covered by this new directive is the construction and real estate sector(European Commission, 2021).

The construction sector, which includes real estate, infrastructure, as well as industrial structures, accounts for 13 percent of the worlds gross domestic product (GDP) and is the global economy's largest industry (McKinsey & Company, 2020). Still, its negative environmental impact is noteworthy, and the built environment is claimed to be a sector emitting more greenhouse gases (GHG) than aviation, electricity production and shipping (Apel et al., 2022). Hence, the sustainability transition of the construction sector is necessary, but environmental benefits are not a sufficient incentive for companies to invest in more sustainable options - they need to also offset economic benefits (Lambrechts et al., 2021).

However, the business environment is changing. According to a survey conducted by McKinsey, 90 percent of the survey's respondents agreed that the construction industry needs to change (McKinsey & Company, 2020). Further, 80 percent believed that the industry would look completely different in 20 year. Apart from the change in directives on an EU level and how finances are increasingly linked with sustainability, customers' increased awareness about the negative environmental impact of their behaviour and consumption patterns has resulted in a change in demand towards more sustainable

products and services (Mokhlesian & Holmén, 2012; Toppinen et al., 2018). *Sustainable construction* - sometimes referred to as green construction - is defined by Mokhlesian and Holmén (2012) as construction where the whole life cycle of a building or project is considered. Further, the authors describe how some of the benefits generated by the product or service delivered should be more environmentally oriented, e.g., by using sustainable building materials. Hence, sustainable construction can be argued to result in *green projects*, defined as projects incorporating environmental considerations (Corbett et al., 2018). Green construction may imply a dramatical change in businesses' environmental orientation, and consequently affect the value creation and capture elements of construction organizations' business models (Mokhlesian and Holmén, 2012). Still, Corbett et al. (2018) describe how there is a gap between corporate sustainability visions and actual actions on a project level.

Thus, organizations in the Architecture Engineering and Construction (AEC) industry need to partly rethink their businesses to meet the change in demand and environmental laws, regulations, and directives. Because those companies unable to adjust their business models to the changing environment face the risk of being outdone (McKinsey & Company, 2020). At the same time, "Companies that familiarize themselves with the next normal and move quickly will be best positioned to both create value and maintain their competitive edge" (Ibid., p.13).

The interest in green investments among actors in the AEC industry has gained more ground during the last years as a result of the implementation of the EU Taxonomy. Companies are starting to understand the importance of incorporating green investments as part of their business, nevertheless, the concept it is still perceived as unclear, and complex. This thesis - written in collaboration with an international, multi-disciplinary architecture and engineering (AE) firm - intends to contribute to the body of knowledge regarding how to manage green investments in relation to green services in a Swedish context.

1.1 Aim

The aim of this thesis is to investigate what is considered a green investment and how it influences the Swedish AEC business environment. Further, it aims to map and put light to both challenges and the potentials with green investments and their part in increasing sustainable construction in a Swedish context, and the transition towards green business models. In addition, the thesis aims at investigating how green investments are managed by a consultancy firm in the AEC sector, and how different green services can increase understanding and willingness among actors in the construction industry to invest in more sustainable options. To reach the aim, activities on a macro-, meso-, and micro level influencing green investments will be identified, in order to find leverage points of how a consultancy firm in the AEC sector may better manage, motivate and value future benefits of green investments, and thus influence the market.

1.2 Research questions

i. What is a green investment and how do green investments influence AEC organizations?

ii. How can a consultancy firm in the AEC organization improve their work processes in order to better:
   - manage green investments?
   - value green investments?
   - motivate the future benefits green investments?

1.3 Delimitations

The topic of green investments is extensive and complex. Green financing and green loans are not the main topic of this report and will hence not be examined or discussed in depth. Furthermore, green investments will only be discussed in relation to European and Swedish governmental policy instruments, mainly the EU Taxonomy, and the Energy Performance of Buildings Directive (EPBD). Other upcoming directives which will influence the European business environment, e.g., the CSRD[1] regulations will not be discussed in this report.

Moreover, this study has been delimited to mainly focus on green investments in a Swedish context. Also, even if infrastructure and industrial structures are part of the construction industry, this thesis will focus on how construction and real estate projects work with green investments. This is motivated by the fact that the construction and real estate industry is covered by the EU Taxonomy, but also due to the empirical setting of the thesis.

1.4 Structure of the thesis

The thesis is structured in eight different sections. In the background chapter, the reader will be introduced to sustainability from a business perspective, and how events on a macrolevel influences the sustainability work of European AEC companies, e.g., the EU Taxonomy of sustainable activities. In addition, the sustainability transition of the AEC industry will be described in terms of green services, and green business models. In the third section, the theoretical framework that will be used analyse and conceptualize the empirical data of the thesis, will be presented, including the theory of Absorption Capacity (ACAP), and environmental competences and capabilities of an organization. The section that follows will describe the chosen methodology in depth and provide a reflection of how it has influenced the work process. Also, this section will introduce the case of the study. The fifth chapter will present the interview findings, and describe how green investments influence AEC businesses according to the study's interviewees. Thereafter, the interviews findings will be synthesised and discussed in relation to the background theory and the thesis' theoretical framework in the report's sixth chapter. Lastly, the conclusions of the study will be presented in the seventh section, answering the research questions (see section 1.2), followed by the author's recommendations for consultancy firms in the AEC sector, and for further research on the topic.

[1] Corporate Sustainability Reporting Directive (CSRD) is a new directive strengthening the rules about corporate social and environmental reporting for large companies in the EU (European Commission, n.d.-b).

2. BACKGROUND LITERATURE

In this chapter, the reader will be provided with an understanding of the background and the relevance and of this study. Firstly, sustainability will be introduced from a business perspective, followed by an introduction of how the EU up to date is working on linking sustainability with finances. Thereafter, the reader will be provided with an introduction of how sustainability influences the business environment of the AEC industry.

2.1 Introduction to sustainability in a business context

Brønn and Brønn (2019) describe how sustainability traditionally has been evaluated through the triple-bottom-line concept, hence, based on the social, environmental, and financial dimensions, and are expected to manage their business in "a manner that is sustainable" (Ibid., p.3) from all three perspectives. The authors describe how the three dimensions together form a triangle, with the managerial focus in its centre, see Figure 1.

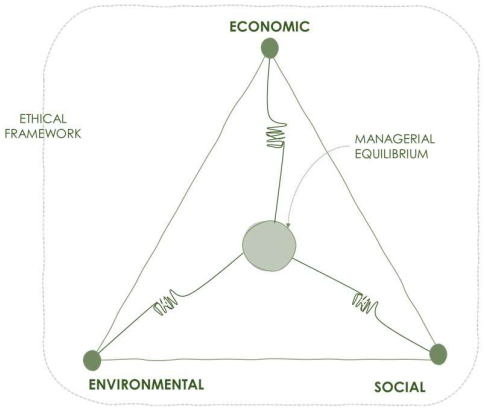

Figure 1, The managerial equilibrium of the sustainability triad. Note: The author's own illustration, adopted from Brønn and Brønn (2019).

Traditionally, the *managerial equilibrium* is often pulled toward the economic corner of the triangle, with less attention paid to the social and environmental dimensions, due to for instance focus on short-term earnings. Similarly, Corbett et al. (2018) describe how economic considerations traditionally have been prioritized over social and environmental concerns. Consequently, environmental initiatives have been needed to result in financial benefits. Yet, Brønn and Brønn (2019) argue that organizations need to adopt new mental models and mindsets of how to manage the question of sustainability, and Bocken et al. (2014) claim that a holistic approach is needed to ensure a sustainable future and how "responses to environmental changes will necessarily need to be in parallel with economic and social change" (p.42).

2.2 Sustainability in the EU business environment

According to the European Commission (2019), both public and private investments are necessary to deliver environmental and social goals, the Paris Agreement, the UN Sustainable Development Goals (SDGs), and to transform the EU economy. Further, it is argued that most capital investments will consider sustainability in projects, and climate actions due to the increased focus on reducing climate risk and meeting the Paris Agreement. Consequently, both public and private capital flows need to move towards sustainable finance.

2.2.1 The EU Taxonomy for sustainable activities

The integration of sustainability considerations in investment and financing decisions have been recognized as a way to reduce the potential effects on economy and financial markets, caused by natural disasters, and social and sustainability issues (European Commission, 2019, p.1). As a result, the EU Taxonomy has been implemented as a tool to support the sustainability transition of the Union (EU Technical expert group on sustainable finance, 2020). The aim of the Taxonomy is to prevent greenwashing, which has been identified as an issue in today's business environment (Schoenmaekers, 2023; Velte, 2023), help companies in becoming more climate-friendly, and shift the economic focus to investments where it is most needed (European Commission, n.d., -c).

To align with the EU Taxonomy, the economic activity itself needs to be environmentally stable, or result in a component which can improve the environmental performance of other activities (EU Technical expert group on sustainable finance, 2020). Further, all economic activities covered by the taxonomy will be evaluated based on the three technical screening criteria in relation to six environmental objectives (see Figure 2). Thus, to be Taxonomy aligned, the economic activity needs to do a substantial contribution to at least one out of the six objectives and do no significant harm to the other five. In addition, the activity needs to comply with minimum safeguards, thus align with the UN Guiding Principles (UNGP) on Business, and the Human Rights and the OECD Guidelines for Multinational Enterprises. The former treats responsible business conducts, whilst the latter addresses abuse of human rights caused by business operations. Substantial contribution criteria are yet only set for the first and second objectives, hence climate mitigation and climate adaptation.

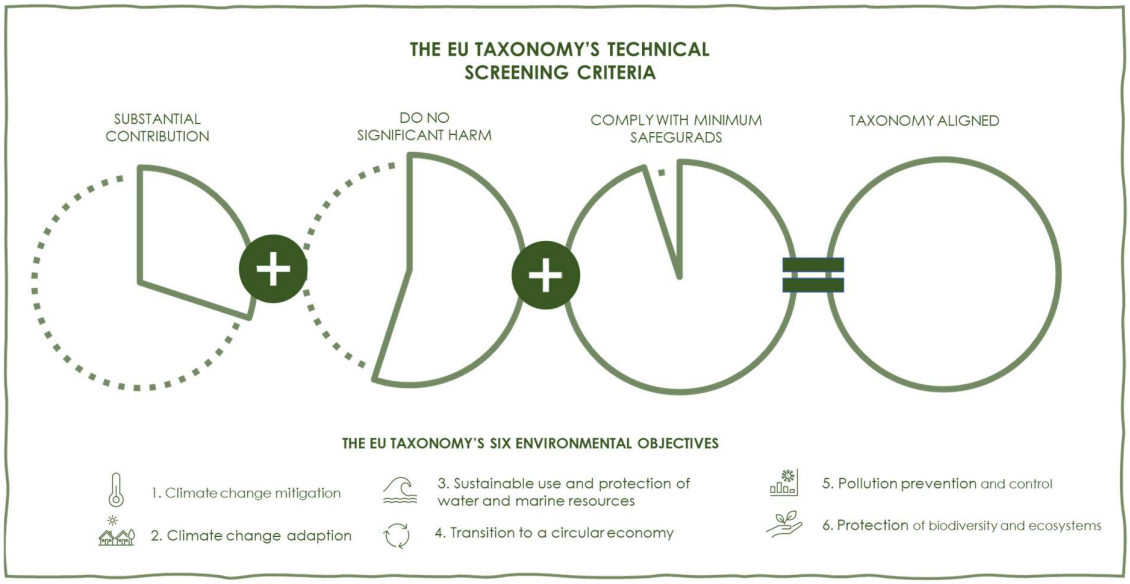

Figure 2, The EU Taxonomy's three screening criteria and the six environmental objectives. Note: The author's own illustration, adopted from Figure 1 in the report by the EU Technical expert group on sustainable finance (2020)

Further important aspects are that the economic activity shall not result in a lock-in of resources (assets) that risks long-term environmental goals, as well as it shall have a significantly positive environmental impact with respect to life-cycle considerations.

Not all economic activities will substantially contribute to one of the six objectives, however, it is described how the EU Taxonomy may work as a tool enabling companies to

identify the overall environmental performance of their business and recognize room for further improvement (European Commission, n.d.-a). As a result, it has the potential to work as an incentive for companies to formulate transition plans and start implementing different measures with the aim of aligning their activities with the three screening criteria. Consequently, the EU Taxonomy is described as a tool to "accelerate the transition to sustainability" (Ibid., p.15).

Moreover, three different stakeholder groups will have to report on their economic activities in accordance with the Taxonomy Regulations, listed in Figure 3 (EU Technical expert group on sustainable finance, 2020).

1. **Financial participants who offer financial products in the EU**
   Obliged To State
   - How, and to what extent, the Taxonomy in has been used in the process of deciding the sustainability of an underlying investment
   - Describe which to environmental objective(s) the activity will contribute
   - Define "the proportion of underlying investments that are Taxonomy-aligned, expressed as a percentage of the investment, fund or portfolio" (Ibid., p. 37).
2. **Large companies already obliged to report a non-financial statement under the corporate sustainability reporting directive/ non-finance reporting directive**
   Obliged To State
   - Disclose the share of their turnover aligned with the Taxonomy
   - Disclose the share of capex, and if relevant opex, aligned with the Taxonomy
3. **EU member states "when setting public measures, standards or labels for green financial products or green (corporate) bonds"**

Figure 3, The different stakeholder groups who will have to report on their economic activities in accordance with the Taxonomy Regulations. Note: The author's own illustration. Source: (EU Technical expert group on sustainable finance, 2020).

To date, 67 economic activities and nine different sectors are covered by the EU Taxonomy (European Commission, n.d.-c). Large companies in the construction and real estate industry fulfilling the criteria for Taxonomy reporting (see Figure 3) are obliged to report on seven different economic activities, illustrated in Figure 4, as described in the seventh chapter of the EU Taxonomy (European Commission, 2021).

ECONOMIC ACTIVITIES IN THE CONSTRUCTION AND REAL ESTATE INDUSTRY COVERED BY THE EU TAXONOMY

1. Acquisition and ownership of buildings
2. Construction of new buildings
3. Installation, maintenance, and repair of charging stations for EVs in buildings (and parking spaces attached to buildings)
4. Installation, maintenance, and repair of energy efficiency equipment
5. Installation, maintenance and repair of instruments and devices for measuring, regulation of, and controlling energy performance of buildings
6. Installation, maintenance, and repair of renewable energy technologies
7. Renovation of existing buildings

Figure 4, The economic activities of construction and real estate companies covered by the Taxonomy. Note: The author's own illustration. Source: European Commission, 2021.

2.3 Sustainability in the AEC business environment

Already in 1999, Bourdeau acknowledged the importance of integrating sustainability in construction companies' businesses by identifying one of the main challenges of the sector as the ability to "transform the demand for sustainable development into an opportunity, to create and access new markets, find innovative responses which satisfy traditional industry demands and the new societal demands for sustainable development" (p.364). Nonetheless, 20 years later, the construction industry is still considered slow-moving, traditional, and cost-driven (Lambrechts et al., 2021), and its project-based nature does – to some extent - obstruct standardized working processes and more universal solutions (Lambrechts et al., 2021; McKinsey, 2020).

Furthermore, construction companies are operating in an environment with multiple actors with different business models, complex value chains, and limited possibilities to invest and take risks due to low-profit margins and limited economic resources (Apel et al., 2022). Consequently, companies tend to manage their own risk due to low collaboration throughout the value chain. Also, this multi-actor involvement is described as one of reasons to why the industry is slow to change. The complex value chains and multi-stakeholder involvement are moreover described to make the division of sustainability responsibility among different actors and processes difficult (Abuzeinab et al., 2018; Mokhlesian & Holmén, 2012).

2.3.1 AEC industry specific policy instruments

According to Lambrechts et al. (2021), governmental policy instruments, e.g., financial incentives, regulations and policy instruments, can boost and facilitate the sustainability focus in the construction industry. For instance, in Sweden are clients obliged by law to present the environmental impact, hence a climate declaration for all new building projects (Boverket, n.d.), an instrument implemented in 2022 to align national objectives and goals with those of the EU (Sadri et al., 2022). In short, the client needs to report on the GHG emissions related to the construction phase of the project (Sadri et al., 2022). On a European level, industry specific instruments and legislative frameworks have been implemented to improve the built environments' negative impact, e.g., the European framework for sustainable buildings, Level(s) (European Commission, n.d., -d), the Energy Efficiency Directive (EED), and the Energy Performance of Buildings Directive (EPBD), (European Commission, n.d., -f). The EPBD will be further explained below.

In the European Green Deal, it is described that the European buildings stock by 2050 shall emit zero emissions and be fully decarbonized (European Commission, n.d., -f). To reach this goal, *the Energy Performance of Buildings Directive (EPBD)* has been formulated. In December 2022, a revision of this directive was proposed by the European Commission, by introducing stricter goals for new and existing buildings (Council of the EU, n.d.). The council agreed that from the year of 2028 would new buildings owned by public bodies be zero-emission buildings, and the same requirement will apply on all new buildings from 2030. Further, minimum energy performance standards will be introduced for existing buildings, with a few exceptions, i.e., religious buildings, historical buildings, and those buildings used for defence purpose. For existing buildings, this minimum energy performance standard "would correspond to the maximum amount of primary energy that buildings can use per m^2 annually" (Ibid., n.d.).

Further, the member states agreed on two maximum energy performance thresholds, based on non-residential buildings' primary energy use (Council of the EU, n.d.). These thresholds will be based on the energy performance of the energy use of the worst-performing non-residential buildings of the national building stock on 1 January 2021. Consequently, the thresholds will be individual for each member state. It is proposed that a first threshold would be set to 15 percent, thus, by the year of 2030 should all non-residential buildings have a primary energy use *below* this threshold. A second threshold would be set to 25 percent, meaning that all non-residential buildings by 2034 would need to have a primary energy use below the 25 percent worst-performing non-residential buildings in 2021. It is possible that these thresholds will be differentiated not only between the member states, but also between different building categories.

In addition to these thresholds, the councils proposed that members states should set minimum energy standards based on national trajectory (Council of the EU, n.d.). The first goal aims at ensuring that all existing residential buildings by the year of 2033 should have a primary energy use equivalent to at least the D energy performance class level. In addition, the council suggested to introduce two new energy performance class levels: A^0 and A^+. If a building has an energy performance certificate of category A^0, this means that it is a zero-emission building. If certified as A^+, the building is not only a zero-emission building but does also "contribute to on-site renewable energy to the energy grid" (Ibid., n.d.). Regarding renewable energy production, the member states did furthermore agree on setting requirements regarding the design of new buildings. Consequently, all new buildings shall be designed in a way that its solar energy generation potential is optimised.

2.3.2 Sustainability assessment tools

To assess and ensure the sustainability of construction projects, different certification systems are used on a national level (Sweden Green Building Council, n.d., -a). Mokhlesian and Holmén (2012) describe how green services related to sustainability assessment tool are important to achieve green construction. By providing green services in the early phases of a construction project, it is possible to integrate sustainable solutions in the building's design, and hence increase the sustainability focus and influence the environmental impact of the project from a lifecycle perspective. Apart from positive environmental effect, it is described how green services can result in business advantages. For instance, construction companies can by certifying new or existing buildings easier receive green loans from bank, and access green financing (Sweden Green Building Council, n.d., -a). Further, Abuzeinab et al. (2018) describe how certifications can be a useful tool from a business marketing perspective.

In Sweden, construction projects can be assessed by the national certification system Miljöbyggnad, or international systems e.g., BREEAM, LEED and WELL (Sweden Green Building Council, n.d., -a). A short description of each and every one of the certification systems, as well as their main objectives are summarized in Table 1.

Table 1, Summary of the four commonly used sustainability assessment tools in the Swedish AEC sector.

Miljöbyggnad bronze, silver, or gold	
Description • A Swedish certification system (Sweden Green Building Council, n.d., -b). • Evaluates the sustainability performance of a building with regard to 16 indicators.	**Main objectives** • Energy use • Indoor climate • Building materials
BREEAM good, very good, excellent, or outstanding	
Description • A globally used certification system for the built environment, founded in the UK in 1990, is (BRE Group, n.d.). • The national adaption, BREEAM-SE, is designed for Swedish conditions and ensures that a building complies with national regulations and laws (Swedish Green Building Council, 2023). • Enables comparison with similar international projects.	**Main objectives** • Energy- and water consumption • Waste management • Indoor climate • Project management
LEED silver, gold, or platinum	
Description • A certification system developed by the U.S Green Building Council in 1998 (Swedish Green Building Council, n.d., -c). • Aims at identifying, realizing and measuring sustainable buildings.	**Main objectives** • Reduce climate change • Increase individual health and well-being • Secure and repair water resources • Secure, improve, and repair biodiversity and ecosystem services • Support sustainable and regenerative resource use • Establish a sustainable economy • Increase common life quality
WELL bronze, silver, gold, or platinum	
Description • A certification system aimed at improving human wellbeing and health (Swedish Green Building Council, n.d., -d). • Building performance and building strategies are evaluated based on 10 different categories and indicators.	**Main objectives** • Air quality • Light quality • Water quality

2.3.3 Sustainable business models and sustainable construction

In the AEC sector, the transition to *sustainable business models* (SBM) is dependent on the use and application of sustainable-orientated processes and the delivery of sustainable products and services. A business model "defines how the enterprise creates and delivers value to customers, and then converts payments received to profits" (Teece, 2010, p. 173), summarized by Bocken et al., (2014) as how resources and knowledge is converted into economic value. A SBM can be defined as a "business model that creates competitive advantage through superior customer value and contributes to a sustainable development of the company and society" (Bocken et al., 2014, p. 44). Lambrechts et al. (2021) do moreover describe how a SBM not only focuses on economic values created but also takes social and/or environmental values into account. Hence, SBM focuses on providing solutions with long-term sustainability and takes multiple stakeholders into account. Alike Teece (2010), Osterwalder and Pigneur (2010) describe how understanding the environment in which the enterprise operates, is key to improving the competitiveness of a business model. Thus, by understanding how and why the environment changes, the business model can more easily be adapted to external shifts. Further, McKinsey & Company (2020) claims how those companies able to transform their business models will experience great benefits. Similarly, Abuzeinab et al. (2018) argue that green business models centred around green value creation and capture can increase an organization's credibility, resulting in both financial benefits and long-term viability.

2.3.4 The economic aspect of sustainable construction and SBM

Even if construction projects are increasingly complex, companies are most evaluated at the lowest price in tendering processes, instead of on alternative design, quality, and reliability (McKinsey & Company, 2020). This is described to result in a focus on operational flexibility and low costs, along with a lack of incentives for long-term process

development (Pekuri et al., 2014). Furthermore, Toppinen (2018) argues that the construction sector for a long time mainly focused on increasing cost-effectiveness, and Lambrecht et al. (2021) similarly claim that construction companies primarily focus on their own products and their profit margins instead of, for instance, maximizing value.

One of the hindrances to increasing the use of green construction is, according to Mokhlesian and Holmén (2012), the high initial costs of choosing 'greener' products or services compared to more conventional ones. Furthermore, apart from high investment costs, Sadri et al., (2022) argue that sustainable construction in Sweden is partly hindered by limited financial resources, a fear of long pay-back periods, and worries about profitability. However, Mokhlesian and Holmén (2012) describe how investments in techniques improving the energy performance of a building can imply huge cost savings, similar to Sadri et al. (2022) who claim that high initial costs can be well compensated for during the building's lifecycle. Also, Sadri et al. (2022) mention how investments in sustainable construction can increase real estate prices.

Another major hindrance to further implementation of sustainable construction is the limited consciousness about both expenses and the benefits among contractors, consumers, and clients (Sadri et al., 2022; Toppinen, 2018; Mokhlesian and Holmén, 2012). According to Mokhlesian and Holmén (2012), clients and customers may lack the knowledge of how to formulate preferences that are sufficiently specific, verified, and measurable which, in combination with the traditional mindset of the sector, is identified as a barrier to further investments in more sustainable solutions and greener options. If not understanding the benefits of using a more sustainable technology or option, some stakeholders will not pay for the extra costs, or may simply not want to pay for the benefits if it is not proven to have a positive impact on their own business.

Thus, Lambrechts et al. (2021) recognized in their study how finance and profitability are preconditions for companies to invest in sustainable solutions, and hence for a successful transition to SBM, since the economic sustainability of the firm cannot be jeopardized. However, Reinhardt (1999) argues that environmental problems should be considered as business issues and should be analysed in the same way. Thus, managers should handle environmental investments the same 'ordinary' investments: to reduce risks and to deliver positive returns. Still, the author highlights the importance of analysing environmental investments from a long-term perspective, since the benefits from this type of investments most often are not realized in the short run, but over long periods. Therefore, to answer the question "does it pay back to be green?" Reinhardt (1999) argue that it is necessary to expand the time horizon and realize that effective management of environmental risks can result in future competitive advantage.

2.3.5 The need for innovation

According to Lambrechts et al. (2021), sustainability should be considered an opportunity and driver for business innovation. However, the rate of innovation in construction businesses is described as low in general (Mokhlesian & Holmén, 2012), and slowed down because of the sector's conservatism (Lambrechts et al., 2021). Yet, Lambrechts et al. (2021) claim that it is necessary to experiment and challenge the market. By using new techniques, it is possible to find innovative solutions and strategies for improvements, and hence fulfil sustainability goals such as CO_2-neutral housing. Furthermore, to innovate construction businesses, Bossink (2011) claim that cooperation and co-

innovation on different levels are necessary. The author describes how teams inside an organization need to innovate together, but also lifts the importance of inter-organizational innovation. Collaboration between different actors, along with transparency, is thus described as an important factor in the process of achieving the green transition (Apel et al., 2022).

2.4 Summary of the background literature

In this chapter, events on macro-, meso- and micro-levels have been presented that influences AEC organizations and their way of managing sustainability in relation to their business. Firstly, the implementation of the EU Taxonomy aims at channelling economic investments to sustainable activities, projects, and companies, requiring large AEC companies to report on their economic activities in relation to this directive. Secondly, the proposed revision of the EPBD will influence AEC organizations and how they invest in sustainability initiatives in order to decrease the built environment's negative impact on the environment and the climate. Further, green building certifications ensures sustainability of construction projects, but are also recognized as a way to increase the value of an estate, meet increased sustainability demand from customers, as well as to access green financial means. Thus, events and initiatives are pushing AEC companies to increase their sustainability focus.

The literature presented have further highlighted the complexity of the construction sector and how it still has characteristics of being slow to change and cost-driven, and that investments in sustainable options are deprioritized on a project level. The literature highlights the need of green construction and the transformation towards sustainable business models in the sector, but that the economic aspect is an identified hindrance to this change, along with lack of knowledge. Nonetheless, it is described how AEC companies will need to change their business models in order to align and adapt to the changing environment, and initiatives on a micro-and meso-level will thus be needed. Therefore, sustainability should according to the literature be considered a driver for innovation, and a business opportunity.

3. THEORETICAL FRAMEWORK

This chapter presents the different theories upon which the empirical data from the interviews will be analysed.

3.1 Absorptive Capacity of a firm

Cohen and Levinthal (1990) define a firm's *absorptive capacity* as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (p.128), and argues it to be "critical to its [the firm's] innovative capabilities" (p.128). Building on Cohen and Levinthal's ACAP model, Zahra and George did in 2002 propose a reconceptualized theory. These authors defined ACAP "as a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability" (p.186). ACAP is therefore described as a dynamic capability which is embedded in a firm's processes and routines, which "influences the firm's ability to create and deploy the knowledge necessary to build other organizational capabilities" (p.188). Thus, it is about understanding new knowledge and knowing how to use it in the specific organizational setting and provides a foundation for a firm to create and sustain a competitive advantage. Consequently, ACAP is of a strategic nature.

Absorptive capacity (ACAP) has been recognized as an enabler to increase a firm's competitive advantage, performance and innovation (Cohen & Levinthal, 1990; Zahra & George, 2002), and has during the last decades been commonly used in the field of research studies concerning organizational strategic management and innovation (Filho et al., 2021). Gluch et al. (2009) did for instance use the ACAP theory when investigating green innovation and performance in the construction sector, while Upstill-Goddard et al. (2016) adopted the theory when examining implementation of sustainability in small and medium-sized construction firms.

3.1.1 The four capabilities of ACAP

A firm's ACAP is described to consist of four complementary capabilities: acquisition, assimilation, transformation, and exploitation (Gluch et al., 2009; Zahra & George, 2002). According to Gluch et al. (2009) do activation triggers together with external knowledge sources and experience function as predictors for acquisition regarding green innovation in the construction industry. *Activation triggers* are "events that encourage or compel a company to respond to specific internal och external stimuli" (Gluch et al., 2009, p. 453), which influence the future of the specific industry in which the firm operates (Zahra & George, 2002), e.g., emergence of a dominant design, technological shifts, and change in governmental policy. According to Gluch et al.'s (2009) study, does stakeholder pressure have a profound influence on how organizations in the construction industry acquire new knowledge and ideas, to achieve green innovation and performance.

Zahra & George (2002) claim that *external knowledge sources*, e.g., contractual agreements, joint ventures, alliances, R&D consortia, and purchasing routines, have a significant influence on a firm's ACAP. Nevertheless, the authors argue that exposure to external knowledge does not necessarily lead to increased ACAP within the organization. At the same time as acquiring knowledge from diverse sources, it is described how the information must, to some extent, be related to the already existing knowledge within the

firm for it to have a positive impact on its ACAP. Thus, the external knowledge sources need to be diverse, yet complementary to the existing knowledge of the specific firm.

Experience is furthermore expressed as a third predictor for ACAP. Gluch et al., (2009) describe how experience is a result of external investigation and scanning, and Zahra & George (2002) claim that the locus of how firms search for information is defined by experience; firms do often search for new information within fields where they have already been successful. Experience can be gained by learning-by-doing, interactions with customers, by alliances with other companies, and so forth.

Since past experiences do have a significant impact on how firms acquire new knowledge, the ACAP model by Zahra & George has been criticized by Todorova and Durisin (2007). These authors argue how it is necessary to include the ability of *recognizing the value* of external knowledge as the first component of ACAP, and thus partly return to Cohen and Levinthal's (1990) initial model. *Recognizing the value* is about individuals 'seeing' and 'understanding' the potential of external knowledge and how it can be of importance for the firm. Todorova and Durisin (2007) describe how previous studies have shown that this process can be hampered by rigid capabilities, embedded knowledge, and path-dependents management cognitions within an organization. For instance, Christensen and Bower (1996) could show that if new knowledge was not considered relevant for the key clients, managers did not value it and it was consequently not absorbed. Therefore, Todorova and Durisin (2007) argue how it is of high importance for organizations to understand this phase of the acquisition process, since the ability to absorb external knowledge, hence learn, partly depends on the ability to value this knowledge. According to Todorova and Durisin (2007), Zahar and George's (2002) first component in the ACAP model is more centered around the process and efforts of gathering new knowledges with speed and efficiency, which they claim can result in new external knowledge being overlooked. Therefore, they argue that it should be re-introduced and made a prior step to the acquisition component in Zahar and Geroge's (2002) ACAP model.

Acquisition refers to the capability of identifying, and acquiring knowledge generated externally that can be considered vital to a firm's operations (Zahra & George, 2002), and is a predictor for assimilation and later transformation and exploitation (Gluch et al., 2009). Having well-working acquisition processes may function as a gate allowing external inspiration and influences flow into the organization, but as described by Todorova and Durisin (2007), it is important to value the external knowledge in order for it to be acquired. Dzhengiz and Niesten (2020) are of the understanding that the two processes of recognizing the value of external knowledge and knowledge acquisition in the ACAP model can be seen as individual learning processes. By scanning and searching their field, individuals can acquire new external knowledge that they find valuable to increase the capabilities of the firm, which can result in developed managerial competencies. Thus, it is important that this process is not hampered by organizational features: the organization needs to allow its members to recognize and absorb new knowledge, and make sure that the already existing knowledge within the firm is not hindering this process.

Assimilation is about having routines and processes that allow the analysis, processing, interpretation and understanding of the information acquired from external sources of the firm (Zahra & George, 2002). Consequently, Gluch et al., (2009) describe it to be of

importance to value the development of assessment and analytical outlines as well as knowledgeable staff to successfully assimilate the acquired knowledge. By having this type of mechanisms, organizational members can more easily interpret a complex reality in relation to action, situated context, and pre-understanding.

Transformation describes a firm's capability to generate and improve its routines with the result of making it simpler to combine already existing knowledge within the firm, with the newly acquired and assimilated knowledge (Cohen & Levinthal, 1990). Hence, it is about gaining new insights about green innovation, and change how an organization "sees itself and its competitive landscape" (Gluch et al., 2009, p. 444). In green innovation, this can be achieved by monitoring environmental targets and performance by using environmental indicators. For this to be successful, Gluch et al. (2009) highlights the importance of having follow-up activities to measure whether the targets have been reached or not, to have the desired effect and to motivate members of the organization. In their study, this process appeared to have a greater impact on a business green performance and innovation compared to the exploitation process.

The exploitation process is the capability of "incorporating acquired and transformed knowledge" (Zahra & George, 2002, p. 190) into a firm's operations. This is accomplished by having routines allowing existing competencies to be refined, extended, or leveraged, or by creating totally new competencies. This is described as an "environmental manager's knowledge to influence strategic decisions, operations and practices" (Gluch et al., 2009, p. 461).

3.1.2 PACAP and RACAP

In contrast to Cohen and Levinthal, Zahra and George differentiate a firm's ACAP into its *potential absorptive capacity* (PACAP) and its *realized absorptive capacity* (RACAP). PACAP "makes the firm receptive to acquiring and assimilating external knowledge" (Zahra & George, 2002, p. 190) and does hence cover capabilities of assimilating and acquire knowledge. RACAP on the other hand is about knowing how to transform and exploit this knowledge, thus RACAP reflects "the firm's capacity to leverage the knowledge that has been absorbed" (Zahra & George, 2002, p. 190).

In order to realize RACAP, *social integration mechanisms* are needed, which are the processes of ensuring mutual understanding and comprehension among organizational members (Zahra & George, 2002). This mechanism contributes to the assimilation of knowledge and can be either informal or formal. Examples of informal mechanisms are social networks, which can be efficient in the processes of sharing ideas among employees, whilst formal mechanisms have a more coordinating nature and are more systematic. Well-functioning social integration mechanisms are argued to increase the efficiency of the capabilities of assimilating and transformation. In addition, it helps in facilitating information sharing. Still, Gluch et al. (2009) could not show that social integration mechanisms served as a moderator, nor as a predictor for knowledge sharing. Nevertheless, they describe how previous studies argue that management support – another type of internal social integration – along with knowledge, flexible internal communication and information sharing, and cooperative organizational behaviour, are indeed important factors for innovation in the construction industry. Todorova and Durisin (2007) further argue that social integration mechanisms influence *all components* of a firm's absorptive capacity, not only the transformation process, since it is based on

shared meanings and connectedness. This can for instance influence how employees seek information, which can have both positive and negative effects on how firms absorb new knowledge.

A fifth component that has an impact on a company's ACAP are *regimes of appropriability,* since it will partly decide if the payoff from PACAP will be high or low (Zahra & George, 2002). The result of Gluch et al.'s study showed that legal demands along with business culture can have a direct influence on a business' environmental performance and innovation. This highlights how institutional structures, hence social, economic and political structures, need to ensure the space needed for companies to "create and protect strategic advantages stemming from development of innovative green products and processes" (Gluch et al., 2009, p. 461).

3.2 Competences and capabilities for environmental sustainability

Responsible management is understood from a broad and holistic perspective based on the triple-bottom-line and should include development of both soft skills, critical thinking, and formal knowledge (Dzhengiz & Niesten, 2020) . Furthermore, it aims at developing a shared vision among stakeholders, and to continuously improve performance and skills through reflections, both individually and in groups. According to Laasch and Conaway (2015), responsible management competencies can be divided in four categories: to know; to do; to interact; and to be. *'To know'* underlines the importance of combining technical and domain-specific knowledge on sustainability, ethics, and responsibility. *'To do'* includes system thinking, to work both on a trans-or interdisciplinary level, and the ability to act and make decisions that are both sustainable, ethical, and responsible. *'To interact'* is about having the ability to interact with stakeholders, and hence focuses on managers' social competences, while *'to be'* includes the ability of managers being committed and feel empathy regarding social, environmental, and ethical issues from a meta-perspective. In their paper, Dzhengiz & Niesten (2020) focus on the sustainability domain of responsible management and more precisely its environmental dimension, to investigate the relation between an organization's environmental capabilities and environmental competencies, which will be further described below.

Capabilities can be defined as "the existing repertoire of possible actions of organizations" (Dzhengiz & Niesten, 2020, p. 885), which Winter (2003), as cited in Dzhengiz & Niesten, (2020), describes as possible actions that already are well established and used in an organization. *Environmental capabilities* can thus be defined as "an organization's abilities to either reduce the damage to, or create benefits for natural environment, while managing the tensions between the environmental and economic bottom line" (Dzhengiz & Niesten, 2020, p. 889), and are related to environmental practices on a group level. In their review, Dzhengiz & Niesten (2020) could furthermore distinguish a difference between *environmental function capabilities* and *environmental organizational capabilities*. The former includes, for instance, stakeholder management, environmental management, collaboration, and training and education on environmental issues, with the aim of integrating environmental objectives in the daily routines of an organization. The latter considers external stakeholders as well as the managing of the firm's relationship with the natural environment, at the same time as it reconfigures, develops, and integrates environmental function capabilities. Further, developing environmental capabilities in a firm includes a change of both practices, activities, and routines at an organizational level to align the firm with environmental development goals. The

environmental capability is thus an organization's capacity of structuring a network that allows communication of the organization's environmental orientation across departments, hence, how to share ideas on sustainability and to "align individual committed behaviour and knowledge with operational processes" (Dzhengiz & Niesten, 2020, p. 890).

Competences on the other hand can be defined as "the existing repertoire of possible actions of managers and organizational member" (Nooteboom, 2009, cited in Dzhengiz & Niesten, p.885), and can be described as a combination of individual skills, attitudes, traits, and knowledge. *Environmental competences* among individuals and managers do hence "lead to the solution of complex environmental problems, and hence contribute to the achievement of a sustainable future" (Dzhengiz & Niesten, 2020, p. 887). By stimulating the development of environmental competences among employees by offering e.g., education on environmental technologies and practices, it is possible to enhance the individual motivation and the ability to adopt innovative ideas by promoting more sustainable practices.

Based on the Laasch and Conaway's (2015) responsible management competencies, Dzhengiz & Niesten (2020) identifies certain attributes of environmental competences. Firstly, environmental competences are strongly related to managers being able to adopt *system thinking*. System thinking is about trying to explore and understand a phenomenon like sustainability as a dynamic process interrelated in a complex system, hence it is not independent and can therefore not be looked at independently. Secondly, *trans-and interdisciplinary work* relates to the ability to interact and communicate across boarders within the organization (e.g., between different disciplines and divisions), as well as collaborating with other practitioners outside of the firm. *Entrepreneurial thinking* is furthermore about being able to handle ecological problems with creativity, and innovativeness. Another important factor is the ability to have *interactive problem-solving skills*. According to Dzhengiz & Niesten' s (2020) review, developing trust-based and collaborative relationships with other actors may result in problem solving that can increase environmental sustainability due to the actors' complementing resources and know-how. Therefore, this is considered an important competence of managers, along with the last competence: to be *future oriented*. Environmental managers who are future oriented can deal with both uncertainty, expectations, and plans, which is important in the organizations environmental work.

Further, Dzhengiz & Niesten (2020) describe how it has been shown in previous studies how individual commitment impacts development of environmental capabilities on an organizational level. Those individuals who have a strong personal commitment to contribute to increase environmental performance, sometimes referred to as green champions or environmental advocates, often think beyond the product or the job they are doing. Thus, they adopt system thinking and have a profonde environmental awareness. These individuals are important, since they often are looking outside their own organization, and actively search for external knowledge of how to develop their daily work and contribute to a more sustainable product or service. Manager's values, commitment, and motivations, as well as their leadership, do consequently affect the development of environmental competences, and "can act as change agents to drive environmental sustainability in business organizations" (Dzhengiz & Niesten, 2020, p. 891).

Dzhengiz & Niesten (2020) argue that there are a dynamic and recurring relationship between environmental capabilities and competencies, thus environmental capabilities contribute to the development of environmental competencies among employees, which in turn lead to the further development of environmental capabilities of the firm.

3.3 Short summary of the theoretical framework

The theory presented in this chapter will work as a framework when analysing the empirical data. Thus, the thesis does not aim at proving insight regarding further development of the ACAP concept, nor environmental competences and capabilities. Rather, these theories will be used to conceptualize how green investments influence AEC organizations, and how this can be managed. The framework is illustrated in Figure 5.

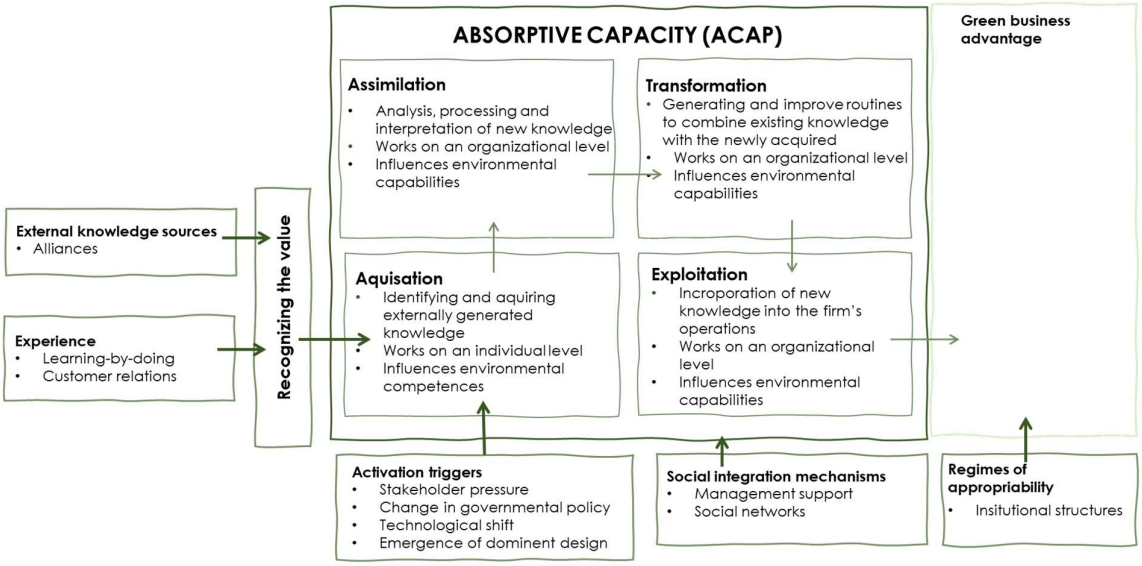

Figure 5, The revised ACAP model that will work as a theoretical framework in this thesis. Note: the author's own annotated illustration, based on Figure 4 in Gluch et al. (2009).

4. METHODOLOGY

In this chapter, the chosen methodology of the thesis will be presented, with the purpose to firstly motivate why the specific research approach was selected as suitable to reach the aim of the thesis, and secondly to present how the thesis was carried out. Lastly, a short reflection about the methodology and the work process will be provided at the end of this section. Thus, to illustrate the dependability of this thesis, to secure its confirmability as described by Bryman and Bell (2017).

4.1 Research approach

Since the aim of the thesis is to investigate green investments' influence on the AEC industry and the green services provided by an AE Firm, a qualitative research strategy with an inductive approach was selected. In qualitative research, the focus is on "understanding the social world through an examination and interpretation of that world by its participants" (Bell et al., 2022, p. 362). Consequently, by adopting a qualitative research strategy, it is possible to identify links between research and theory. With an inductive reasoning, theory is a result of a research process and the collected data, and conclusions are drawn on basis of observations. The thesis adopted an explorative approach, which means that the theoretical framework used in the analysis and discussion, was chosen after the collection of the empirical data.

Further, this thesis was performed in collaboration with an international and multidisciplinary Swedish AE consultancy firm with a well-established sustainability profile. Thus, in order to answer the research questions a case study of this specific firm was conducted. According to Stake (1995) as cited by Bryman and Bell (2017), should the case be selected based on the learning outcomes that the study is expected to generate. Since the firm is working actively with green investments on an organizational level and provides service related to green investments, the case was evaluated in such a manner that it would not only generate valuable insights for the single firm, but also be applicable in a similar context.

The thesis consisted of a literature study, a pre-study, an interview study, an analysis-and-conclusion phase, and lastly a presentation phase. As illustrated in Figure 6, the literature study was an ongoing part of the thesis work and was consequently conducted simultaneously with the pre-study and the main interview study. As part of the project's first phase, a pre-study was performed consisting of semi-structured interviews with employees at the consultancy firm with knowledge and experience of working with green services in the AEC sector. The pre-study aimed at getting a broad and comprehensive understanding of the current situation regarding green investments in the AEC industry in order to frame the project even further, and thus simplify the limitation of the project's scope. Also, it facilitated the process of gathering relevant information for the main interview study. The aim of the interview study was to gather qualitative research data, thus relevant insights, opinions, and knowledge, about green investments in relation to the AEC industry. The results were then summarized and analysed with regard to the thesis' theoretical framework, which was chosen in the end phase of the interview study. Thereafter, all the empirical data was discussed and synthesized, and conclusions were formulated.

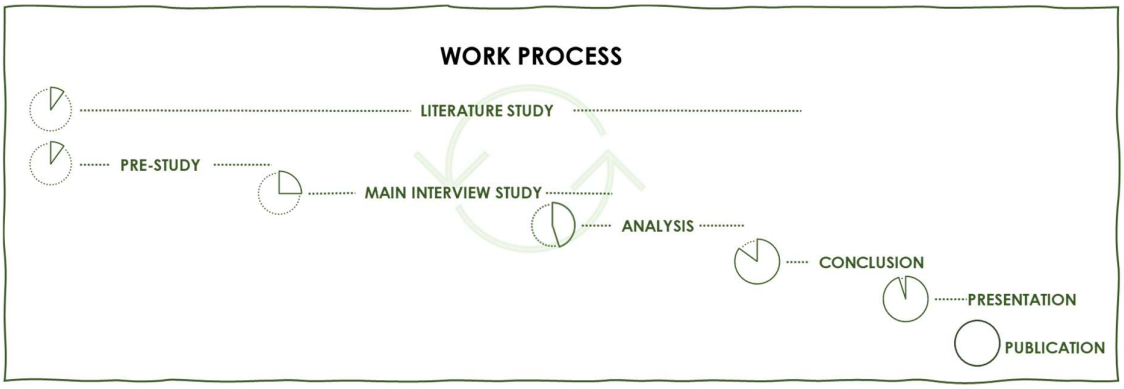

Figure 6, The work process of the thesis

4.2 Context of the study

According to Bryman and Bell (2017) is a case often associated with one specific location or setting, e.g., an organization or a workplace, with a focus on studying a specific theme or situation. This thesis was conducted in collaboration with a big, international, and multidisciplinary architecture and engineering consultancy firm – from now on called by the epithet the AE Firm - with the aim of examining how green investment influences the industry and the green services provided by the firm. Due to the AE Firm being recognized to have high competences regarding sustainability in the construction sector, in combination with working actively to increase its competencies and capabilities regarding green investments, it was argued as a suitable case for this specific study.

In the earlier stages of the thesis process, the author discussed the topic of green investments with a representative at the firm. The AE Firm acknowledged the complexity with green investments and described how the concept in general is considered vague and unclear, both among customers to the firm, but also among employees. They had observed how their customers struggled to understand green investments and did therefore show an interest in investigating how to better motivate the future value of green investments in order to strengthen its green services. Apart from generating more in-depth-knowledge about how the individual firm works with green investments, it is believed that the case study also can contribute with valuable insights of how to manage green investments in other similar organizational settings. Consequently, the criteria of transferability of qualitative research as described by Bryman and Bell (2017), has been taken into consideration.

4.3 Literature study

As part of the thesis work, a literature study was carried out with the aim of "reviewing the main ideas and debates in the field" (Bell et al., 2022, p. 91). The first part of this process focused on creating the theoretical background of the thesis, covering empirical topics such as green investments, green financing, policy instruments, standards, certifications etcetera, sustainable business models in the AEC industry, as well as challenges related to sustainable construction in the industry. The second part of the literature study aimed at constructing the study's theoretical framework, covering literature about the theories of absorptive capacity and environmental competences and capabilities.

By using the academic databases Scopus and Google Scholar and keywords in different combinations, relevant academic journals and papers could be found. In addition,

literature used in previous courses performed at the Chalmers University of Technology was used in the study. Apart from academic papers, international and national public documents, directives, etcetera were also covered by the study. The website of the European Commission was for instance, used in order to find information and documents about sustainability regulations, the EU Taxonomy, and so forth.

4.4 Pre-study

The pre-study consisted of a document study and semi-structured interviews with consultants at the architecture and engineering consultancy firm. The pre-study enabled the author to create a general understanding of the thesis topic, test interview questions, and to identify possible respondents for the main interview study. The document study's focus was to get a comprehensive view of the concept of green investments and to get comfortable with relevant regulations, standards, and certifications.

In order to create a general understanding about how the consultancy firm works with green investments today, semi-structured interviews were conducted with four consultants at the firm. In semi-structured interviews, the author has prepared a list of topics and questions that he or she aims to discuss with the respondents (Bryman & Bell, 2017). It is described how this interview style allows the respondent to answer the questions freely, at the same time as the interviewer has the possibility to ask run-up questions. He or she is furthermore not obliged to ask the question in the same order as listed in the interview guide. The pre-study interviews were considered a way to test interview question. Therefore, the author had on beforehand created an interview guide to help answering the research question of the study without being too specific, as recommended by Bell et al. (2022). The interview guide included general questions about green investments, challenges and potential, incentives to why companies in the construction industry make green investments, how the AE Firm works with green investments today, and the role of national and international directives, regulations, and laws. These interviews gave the author valuable insights about the topic in general, but also resulted in an understanding of how the AE Firm works with green investments in projects as well as on an organizational level. These interviews made it possible to further delimit the scope of the thesis and further development of the interview guide. Just one of the interviews were recorded. During the following three, the author did only take notes by hand.

4.5 Main interview study

Bell et al. (2022) describe how interviews in a qualitative study are flexible and have a main focus on the interviewees' opinions regarding the research topic. In this thesis, the aim of the study was to collect qualitative data and to gather knowledge, opinions, and insight regarding green investments in the AEC industry. Thus, collecting empirical data by the use of qualitative interviews was argued as suitable. Before the interviews – which were of the same semi-structured nature as in the pre-study - the author made a few annotations to the interview guide used in the pre-study, in order to help answering the research question of the study even better. Two different interview guides were developed: the first guide was used in the interviews with employees at the AE Firm, whilst the second in the interviews with customers to the firm. Most of the questions were recurring, however, some changes were made depending on the respondent's professional role and organization.

4.5.1 Interviewees

As described in Chapter 4.4, suitable interviews were identified in the pre-study. In order to create an understanding of how the AE consultancy firm works with green investments today, employees with different roles and from different groups were asked to participate. Most of the respondents from the consultancy firm had managerial responsibilities, and worked at the same division at which the thesis was carried out. However, a few of the respondents worked at other divisions. In order to better understand the client's perspective of green investments, a few customers to the consultancy firm were interviewed. Alike the respondents at the consultancy firm, all of the customer respondents had a management position and worked at construction or real-estate companies. In total, 17 employees from the consultancy firm were asked to participate in the interview study, and 13 accepted, one declined, and three did not respond. Seven customers to the AE Firm were asked to participate, five accepted, one declined, and one did not respond. Each of the interviewees has been provided with an interview-ID, as illustrated in Table 2.

Table 2, List of the study's interviewees

Interview-ID	Organisation
AEF1-AEF4	The AE Firm, pre-study-participant
AEF5 – AEF13	The AE Firm
CU1 – CU5	Customer to the AE Firm

4.5.2 How the interviews were conducted

As earlier described, all interviews were of a semi-structured nature and held by the author alone. The majority of the interviews were held online over Microsoft Teams, but eight of the interviews were held in person. Furthermore, all interviews were recorded by using Microsoft Teams, and the program was also used to transcribe the interview.

All interviewees were sent an invitation email after they had accepted to participate in the study. In the invitation, they were distributed an information document describing the main topics to be discussed in the interview, as well as informing them about the ethical considerations made, which will be further described in section 4.7.1. Still, as a first part of the interview following the author's brief presentation of herself and the topic of her thesis, the respondents were informed orally about these considerations. The author described how their personal information and the gathered empirical data would be managed in accordance with GDPR, how the interviewees would be anonymized in the report, and lastly the author asked if the respondent approved of being recorded.

4.6 Data analysis

To analyze the empirical data of this thesis, a *thematic analysis* approach was adopted, and the analysis process can be described to consist of different phases. As describe in section 4.5.2, all interviews were recorded and transcribed by using Microsoft Teams. Shortly after each interview, the author listened to the recorded audio file simultaneously as reading the transcript generated in Microsoft Teams, correcting it where needed. The first phase of the analysis process was carried out during the main interview study. During this phase, the author started to identify different themes of how green investments influence the AEC business environment. This is according to Bell and Bryman (2017), an important part of a thematic analysis. Examples of themes identified

in the first part of the data analysis was: *what is a green investment, incentives, challenges, values, how to manage green investments, and how to motivate green investments.* To visualize the themes and how they were related, the author used a digital mind-mapping tool to get a comprehensive understanding of the identified themes and sub-themes.

The second phase of the analysis process started after the author had defined the theoretical framework of the study. Based on the framework, the transcripts were analyzed in detail by using the software NVivo, and the empirical data was sorted based themes related to ACAP, i.e., *activation triggers, social integration mechanisms, regimes of appropriability, business advantage, experience, and external knowledge sources, and competencies and capabilities.*

When summarizing the interview findings, the themes identified in the first phase of the analysis were linked to the themes used in the analysis that was carried out in NVivo, and presented in the interview finding. The author did further use data triangulation to strengthen the results, described as a way to ensure the credibility of qualitative research (Bryman & Bell, 2017), and hence data were considered viable if confirmed by several respondents. However, due to the varied experience of working with green investments among the respondent, this was not always possible. Some statements made in the interviews were of value in order to provide the results with an extra dimension about the topic. Still, these insights needed to be confirmed or related to the theory presented in the background, to be considered viable and worth presenting in the interview findings. The interview findings were thereafter analyzed and discussed in relation to the theory presented in the background chapter and the theoretical framework of the thesis, to provide answers to the thesis' research questions. Lastly, conclusions were drawn based on the analysis and discussion of the empirical data.

4.7 Methodological considerations

In this section, the ethical considerations taken will be presented, followed by a reflection about the chosen methodology.

4.7.1 Ethical considerations

According to Bell et al., (2022), ethical principles are important in business research to minimize ethical risks. The authors introduce four main ethical principles (as formulated by Diener and Crandell, 1978), namely, that harm to participants should be avoided; informed consent; ensuring participants' privacy; and avoidance of deception. The first principle is about ensuring that no participants can be harmed if participating in the study, whilst the second highlights the importance of getting participants' consent. The latter is about providing the possible participants as much information about the study, its purpose and aim, in order for them to make a well supported decision whether they want to participate or not. The third principles, which is linked to informed consent, is about making sure that the participants' privacy is protected. Hence, if they do not want to respond to a question or withdraw from the study due to the feeling of questions being too private, this should be respected by the researcher. Lastly, preventing deception is about being transparent with the study and the interests of the researcher, thus not presenting the research as something it is not.

In the interview study, all of these four principles have been taken into account. Firstly, all participants of the study have been made anonymous in order to ensure their privacy.

Furthermore, all possible interviewees were well-informed about the thesis' purpose when firstly contacted, giving them the opportunity to decide whether they wanted to participate or not. Also, they were all informed about the fact that the thesis would be published when finished. When agreed upon participating, the interviewees were informed about how the author would treat the General Data Protection Regulation (GDPR) in her thesis work: all personal information and interview data would be treated in accordance with GDPR. The author did also ask permission to use the information from the interviews in the study, and if quotes were used in the thesis, it was with the participant's consent.

To strengthen the second and third principal even further, all respondents were after the interview sent an email asking them to confirm how they wanted interview material to be used by the author. Based on the recommendation of Kaiser (2009), all respondents were provided the following three options, and were asked to inform the author about their choice by email. Those respondents who chose alternative B or C, were sent a second confirmation email, if citations were needed.

A. **Everything said by me can be used and quoted without any further consent,** I am aware that my name, nor my role or company will be used, mentioned, or provided in the thesis.
B. **Everything said by me can be used and quoted with my consent**, I am aware that my name, nor my role or company will be used, mentioned, or provided in the thesis.
C. **Everything said by me can be used (but not quoted) and some parts must be modified in a way making it unidentifiable, with my consent,** I am aware that my name, nor my role or company will be used, mentioned, or provided in the thesis.

The thesis was carried out together with Chalmers University of Technology and the AE Firm, and the ethical guidelines of these organizations have consequently been underlying during the work of the thesis and when communicating with different stakeholders. Also, the respondents who participated in the study was also provided with the final result. Consequently, the ethical considerations presented in this section can be argued to strengthen the credibility of this study, as described by Bryman and Bell (2017).

4.7.2 The author's reflection about the thesis' methodology

The research approach applied to this thesis was in general considered well suited to reach the outstated aim. However, when finished it is possible to identify room for improvements regarding the work process. Firstly, due to choosing an explorative research approach, the theoretical framework was chosen after the interview study, which to some extent obstructed and delayed the analysis process. Before being able to start analyzing the data in depth, the author had to understand the different theories used in the framework. Further, since the interview guide had not been developed with the framework in mind, the author had to decipher how the themes in the interviews related to the framework, in order to summarize the interview findings. Thus, if the theoretical framework had been decided on earlier, it would have facilitated the analysis process, resulting in less time constraints.

Secondly, the author of the thesis can conclude how the topic could had been even more delimited to facilitate the work process. Since the topic under investigation still is rather new, and in general is considered vague and complicated among practitioners, it would have been beneficial with more concise and narrow research questions. On the other hand, as a result of the aims and the research questions being broad, the author got the opportunity to develop the thesis as time passed, which was considered a creative and inspiring process. In addition, due to not being limited to one group or division at the AE Firm, the author got the opportunity to interview a width of different respondents, which can be argued to be of value to get a diverse understanding of the subject under investigation.

5. FINDINGS: GREEN INVESTMENTS IN THE AEC BUSINESS ENVIRONMENT

Both customers and employees at the AE Firm reflected on the broadness of how a green investment on one hand can be focused on delivering concreate business values such as economic gains, whilst it on the other hand can be an economic activity focused on creating softer and more long-term values, such as change of behaviour and increased well-being. This was elaborated on by AEF5.

> *"Actually, it can be quite a lot I think.... It is on some kind of investment, such as improving the energy performance of a building by replacing its windows or putting in meters to keep track of its energy consumption. But a green investment can also be about soft values. So, how do you work with behavior change with your employees, e.g. how do we get our employees not to take the car to work, but to travel by public transport, to cycle, how do we promote that type of investment? /…/ So, for me, a green investment doesn't necessarily always have to be in hard currency, but it can also be about behaviors…. and that's as far as green investments in hard currency will last. We will still need to work with consumption patterns, how we consume, how we behave in society, and it is not something that you can put a financing on, but it is a long-term work - about behavior patterns. It depends a bit on what you're looking at." – AEF5*

Still, the general understanding among the respondents were that the sector, discusses green investments in terms of energy performance measures, to reduce the climate impact of a building, and green building certification systems. Nonetheless, it was recognized in the interviews how there is an ongoing shift in the AEC industry of how to value and work with green investments.

This chapter is divided in four sections: 1) identified incentives to why companies make green investments; 2) identified challenges with green investments, 3) business opportunities; and lastly 4) how green investments can be managed on an organizational level, as well as in projects. Further, in the end of each subchapter, the interview findings will be summarized and linked to key factors for green business innovation.

5.1 Incentives for making green investments

According to the interviews, there are different incentives why companies in the construction industry are interested in green investments, which all will be presented in the following sections.

5.1.1 Financial incentives

From the interviews findings, it appears that one of the strongest incentives why companies in the AEC sector are doing green investments, are due to expected economic benefits. It was expressed in the interviews how green investments are expected to result in lower operational costs related to energy performance of buildings or facilitate the process of access green loans and green financial mean, as expressed by CU5:

> *"We make investments to make it cost less, for example when we make energy efficiency improvement. Then it can [be] based on the fact that we see that we can get better loan terms if we have an environmentally certified and green property and then it is something that we save on in the long run. If it's a 10-year loan, we know*

that [on] this [loan], maybe we can get some margins down in the interest rate and then for us it's also financial gain. " – CU5

All interviews discussed how stakeholders influence companies to do green investments, among which capital actors appeared to be of high importance. Due to the ongoing sustainability shift within the financial sector, partly being a result of the implementation of the EU Taxonomy, the interviewees were of the common understanding that companies in the AEC sector will need to adapt their businesses to this change in order to secure future capital. CU5 and CU4 shared two examples on how the change in demand from capital actors affects construction companies:

"So investors have demands on themselves, disclosure requirements on which companies they invest in, so that's why it spills over to us: they want more companies in their portfolio that are classified as green businesses. So, it's very clear in the last 2-3 years I would say, that investors are demanding that we partly inform about green investments, but also that we should show that we have an ambition to increase that [share]" – CU5

"It's important that in some way sustainability can go hand in hand with the economy, because you have different driving forces. We all have our shareholders to take into account as well. So, it's good that this incentive has been introduced, [for companies] to actually benefit in some way from [their] sustainability work. " – CU4

Further, both AEF9 and AEF8 expressed how they during the last years have observed an increasing interest for green investments as a result of companies starting to understand their potential business value. Thus, the interviews revealed that the capital market is an important stakeholder in the transformation of the AEC business environment due to the simple fact that 'money talks' – a recurring phrase in the interviews. When asked what role of the capital market is to increase the interest for and accelerate the numbers of green investments in the AEC industry, many of the respondents were of the same understanding as CU2:

"Well, it [the capital market] plays a huge role because after all, money determines whether to make an investment [or not]. And different types of capital: it can be banks, but it can be other investors [as well]." – CU2

CU5 did further discuss how the way capital actors are shifting their focus towards green investments will facilitate the work of incorporating sustainability at the core of construction companies' businesses. Consequently, this respondent describe how this shift can support the transformation to sustainable business models.

5.1.2 EU directives

In the interviews, green investments were in general discussed in relation to the EU Taxonomy. It was described how companies today are increasingly interested in aligning their economic activities with this directive, due to the increased sustainability focus among capital actors. The way the EU Taxonomy starts to link finances to sustainability by providing the EU business environment with a common language of how to classify an investment as green, was welcomed by all respondents. In addition, it will requires companies to actually report on their economic activities, which by some of the respondents is believed to decrease the risk for greenwashing. This new directive was further considered important to increase the interest among those actors who previously

have not seen the benefits of investing in more sustainable activities, companies, or projects. Even if not considered to be the final solution, CU1 discussed how the EU Taxonomy will be valuable in the sustainability transformation of the AEC industry:

> *"It can definitely help in the journey, because it can highlight things and above all, it can maybe get more financially minded people in the company, CFO and so on, who have not maybe had their eyes on sustainability, [they] can simply start to see the benefits. Because the fact is that you get a greater traction in sustainability issues when there is also a financial interest" – CU1*

Moreover, several respondents described how the EU Taxonomy will force companies to shift their sustainability focus to other areas that historically have been of low priority in the construction industry. Both AEF8 and CU5 expressed how they believe that construction companies will start to focus on other aspects of environmental sustainability apart from energy efficiency measures and climate reduction and mitigation. CU1 shared an example of how this respondent's company as a result of the implementation of the Taxonomy now worked actively with climate risks, a sustainability aspects that they otherwise have not focused on previously. AEF8 did further describe how she believes that when all screening criteria of the Taxonomy are set, this will open up for the possibility of doing other types of investments which may not have climate mitigation and adaption as a main focus, e.g., circularity or biodiversity. This is expressed to be of value for those companies not being able to align with the taxonomy based on energy performance improvement.

Even if the respondents in general were positive to the EU Taxonomy, some of the interviewees criticized the big focus on energy performance and use. Nevertheless, all respondents agreed on that that the EU Taxonomy will increase the interest in green investment, but also influence how companies work with sustainability in general in their organizations, as observed by CU5.

> *There is talk about how this in some way also is a step backwards for sustainability work, since only certain parts of the EU Taxonomy has been released; there is a lot of focus on energy and climate emissions, but I think ... In a way, it is always the case with sustainability work that you should start [with the areas] with the greatest impact, and hence, the real estate and construction industry has a big responsibility for reducing energy use. So, we just have to /.../ continue to this work, and then more and more goals will be added on in the EU Taxonomy with biodiversity and so forth. [This] will increase the focus on those areas as well. – CU5*

5.1.3 To minimize future business risks

The interview findings could reveal how companies in the AEC industry consider green investments as a sort of business risk management strategy. As a result of the revised EPBD (see section 2.3.1), several respondents discussed how companies in the AEC industry will need to ensure a certain energy performance standard of their buildings, to meet the new requirements of this directive. If not, companies face both the risk of not being able to let out the building, and the risk of the building being valued less, both of which resulting in a loss of revenues. Thus, the building may be profitable today, but if no measures are taken, it may not be in a few years. Further, AEF6 describe how buildings with a low energy performance will be considered a credit risk by capital actors, and they

will consequently not be willing to invest in these buildings, which in short make it more difficult to access green loans and financial means.

Moreover, in the interviews, green investment were commonly discussed in relation to certification systems. It was described how certification systems traditionally has worked as a quality mark showing that a building meets a certain standard, which have been of value for capital actors. Also, certified buildings are often valued higher compared to those buildings that are not. However, CU4 believed that certifications rather would become a hygiene factor, and several respondents had observed how different stakeholders are increasing their focus towards how a company manages future climate risks. This was discussed by CU5, who describe how making green investments are a sort of risk management:

> *"This is something that both the board and our owners and shareholders and investors, but also from the perspective of the banking sector in the form of loans and bonds, that they demand clarity in how we manage risks. Climate-related risks are one of them, and energy prices are [another type of] risk. How we manage those risks and so forth. So, how to manage risks are also a big part, or have become an increasing part of sustainability issues. " – CU5*

Thus, according to the interview findings, 'not being green' will become critical from a business perspective and should therefore be managed as a business risk. AEF12 expressed how companies consequently will need to evaluate their business models in order to minimize these future risks. Yet, AEF12 did also point out how this can result in increased revenues since if making green investments in a building, it might be possible to increase the rent due to a growing demand or sustainable buildings among customers. Hence, as expressed by CU4, green investments have the potential to secure future revenues.

5.1.4 Customer demand

Further, the interviews identified meeting customer demand as a fourth incentive why companies in the AEC sector are interested in green investments, even if not considered one of the main triggers. A common belief among the respondents was how customer awareness about green investments yet is not high, due to the concept still being too abstract. However, the interviewees had observed that customer's sustainability awareness in and demand for sustainable products and services are increasing. AEF7 had for instance noticed how companies today as a corporate requirement, only are interested in renting certified offices, which also was discussed by CU3. Still, customer demand appears according to the interviews to work as an incentive for construction companies to increase green services and green construction, rather than being a main incentive to why companies are interested in doing green investments. Nevertheless, both AEF9 and AEF7 were of the common understanding that the customers do have an important role in the transition, since if they are requesting green buildings, companies will need to adapt to this change in demand. The importance of customer demand in relation to other stakeholders was elaborated on by AEF8.

> *"If there are no legal requirements, you lose a lot of customers in that mindset right away. If there is no requirement that you need to take into consideration or have a process to manage, then you lose that thinking [sustainability thinking] very quickly in the broad base of projects, I would say. It is exactly the same with the AE Firm's*

customers; If there are demands from their own customers where they risk losing a customer base or business as a result of not being green, theses questions [regarding sustainability] are prioritized and put on the agenda. One have to understand that these companies, real estate companies, or other industries, want to make money and therefore there needs to be a demand from their own customers, or from their investors, for that to happen. " – AEF8

5.1.5 Legislation and governmental policy instruments

According to several respondents are legislation and governmental policies strong and important steering mechanisms to transform the AEC industry. Consequently, governmental laws, regulations and standards were expressed as incentives for why construction companies are interested in investing in green services and green products. In fact, some respondent argued how complying with laws and regulations sometimes are the only reason to why construction companies take environmental considerations into account at all. Still, it was reflected in the interviews how governmental policy instruments do not change and develop at the same pace as the industry and the capital market, nor with the new directives from the EU. Some interviewees considered this as an issue since the government has the possibility and the responsibility of providing the industry with long-term stability, and thus support business innovation and the sustainability transformation of the sector.

5.1.6 Reach corporate goals

In the interviews, it was revealed how corporate goals work as incentives why companies in the AEC industry are interested in green investments. CU4 described how this respondent's company has a corporate goal of being the most sustainable company on the market, and how green investments consequently were considered to play an important role in the process of fulfilling this goal. Other respondents discussed the importance green investments to meet the demand of the board and its shareholders. Several of the respondents did further highlight one of the main values of green investments: to reach the corporate goal of contributing to the green transition. At the same time, it was at pointed out that this is not the case for all companies, since not all are as commitment to sustainable development.

5.1.7 Summary of identified incentives for making green investments

From the interviews, it appears that there are different incentives to why companies in the AEC industry are interested in green investments. The identified incentives and how they can be considered to influence green innovation in the AEC sector is summarized in Table 3.

Table 3, Summary of the identified incentives for making green investments

Identified incentives	Key factors for green business innovation
Financial incentives	**Activation trigger** - Stakeholder pressure: change in demand from captial actors
EU directives	**Activation trigger** - Stakeholder pressure: change in governmental regulations
To minimize future risks	**Activation trigger** - Stakeholder pressure: change in demand from captial actors - Stakeholder pressure: change in governmental regulations
Customer demand	**Activation trigger** - Stakeholder pressure: change in customer demand
Legislation and governmental policy instruments	**Activation trigger** - Stakeholder pressure: change in governmental policy **Regime of appropriability** - Institutional structures
Reach corporate goals	**Activation trigger** - Stakeholder pressure **Green business advantage**

5.2 Identified challenges

The following section will present the challenges with green investments that could be identified in the interviews.

5.2.1 Lack of a clear definition

When asked what the challenges with green investments are today, all of the respondents mentioned the lack of a clear definition. Several respondents pointed out the complexity with green investments, since what is considered green or sustainable today may not be the same tomorrow. This challenge of how to define an investment as 'green' was elaborated on by AEF13. The EU Taxonomy was considered an important tool among the majority of the respondents since it contributes with a common language of how to classify an economic investment as 'green'. AEF13 agreed but acknowledged that this type of regulations may not necessarily be the best way for all companies to work with green investments in their business. AEF13's perception was that a green investment can be defined differently depending on the context, and she pointed out how it is important to set context specific goals, KPIs etcetera, in order to define and evaluate the green investment in the specific case. These can be based on the EU Taxonomy, or other regulations and directives if considered more suitable, e.g., the SGDs. CU5 gave an example how they at this respondent's company are working with making green investments more concrete.

> *"Then it's usually these concrete things that you come back to: What can we do? Well, we can certify both our existing property portfolio to a greater extent and then set goals to certify our newly produced [buildings] and then formulate extra requirements to know if they fall within the framework of what we call a sustainable and green investment." – CU5*

CU5 elaborated on this further and pointed out the need to set other goals and targets, even if the main objective is to align with Taxonomy in the end:

"It's always the case with sustainability work. /.../ The Taxonomy and such frameworks are never easy to understand, so you need to sort of funnel down [to] what it is that we actually need to do." – CU5

Furthermore, several respondents expressed a need for the capital actors to communicate what type of investments they are interested in, and to provide the industry with clear conditions for how an investment is classified as green, along with financial key numbers. According to the interviews, knowing what to report on and how to follow up the investments made, is of great importance to facilitate the work among companies in the sector. These thoughts were summarized by CU5.

"But that's what's going on now really /.../ that we are all starting to working with the same language and definition of what a sustainable investment or green investment is /.../. But the principles then: what is required? And clarity in what are the requirements, and reporting [demands] so that we can follow it up and to know what is expected. Then it is always the long-term perspective that is for security for everyone who makes the investment really. Knowing that it is as you are investing in also something that is classified as sustainable or that it is a long-term investment" – CU5

CU4 described how they at this respondent's company communicate actively both with banks and financers to inform and learn from each other about how they are working with green investments. This respondent was also of the understanding how it will be of great values for Swedish capital actors to have a dialogue with the industry and effectively communicate how the requirements of the Taxonomy will be applied to the Swedish context. CU4 also requested the EU Taxonomy to be aligned in the different certification system, and had like some of the other respondents observed and was positive to how this Europe and directive had been introduced in the new version of Miljöbyggnad - Miljöbyggnad 4.0.

5.2.2 Risk of losing other dimensions of sustainability

When asked the question if a green investment is a sustainable investment, most of the respondents concluded that it is not. This was motivated by the word 'green' being unclear and lacking a clear definition, whilst 'sustainable' can be derived to, for instance, the Brundtland Report and the UN's Sustainable Development Goals. Therefore, the interviews revealed how a green investment is focused on environmental sustainability. However, both employees at the AE Firm and the customers did in their interviews highlight the complexity of sustainability, and how there always are, and will be, conflicting interests between the environmental, social, and economic dimensions. Even if the general understanding among the respondents was that green investments have a positive impact on the AEC sector's sustainability work, the risk of the other dimension being shadowed of the environmental dimension, was pointed out in several of the interviews. It was also expressed how not all aspects of environmental sustainability is taken into consideration up to date, e.g., biodiversity and other ecosystem services.

"with all due respect to green investments, but I believe that we need to broaden the concept in itself. I believe the risk otherwise is that you lose other aspects of sustainability because there is not a hard currency on those" – AEF5

5.2.3 Deprioritizing

The interviews revealed that investments in more sustainable solutions still are deprioritized on a project level. The employees at the AE Firm discussed how not all customers are interested in increasing the sustainability agenda of a project, which was described as a challenge since the customer, or the client, is the only party with the mandate of making final decisions. Customers lack of interest in, or reserved approach towards, green construction was explained to be a result of lacking interest in sustainability issues, a lack of financial means, a fear of or unwillingness to try new solutions, or a lack of top-management support. Another mentioned explanation was the simple fact that some actors are not willing to pay for the extra costs that a more sustainable option may imply, because of not seeing the long-term benefits of this option or how it will pay back. Also, some of these interviewees had observed how customer not being able to understand the more long-term benefits of an investment is a challenge related to green investments and green construction. Hence, when asked if investments in more sustainable solutions are deprioritized on a project level in the construction sector today, all om the employees at the firm answered yes in agreement. AEF9 talked about this and explained it as follows:

> *"No, but it's the cost aspect that comes in. It is still the case that what you opt out of it [investments in more sustainable options] for certain reasons. When economics is opposed to sustainability, then there is something there: part of the willingness to invest actually disappears, which means that it requires a quite stable and secure management that stands behind its set goals and visions." – AEF9*

Thus, according to the interviews, to be able to configurate economical values of doing a green investment is of great importance, since the economic aspect is one of the main drivers in the AEC sector today. Even if the respondents express how some actors are proactive with a high awareness regarding sustainability in general, companies need to ensure economic stability of the firm. Consequently, even if admitting that it is possible to influence a customer to choose greener services and solutions, it is necessary to be able to link sustainability with economics.

> *"Yes, I feel that it is possible to influence [the project] / .../ but it is also necessary to clearly demonstrate the economic effect [of the more sustainable option]" – AEF12*

5.2.4 Lack of arenas for making green investements

A different perspective on challenges with green investments was discussed by AEF8 and CU1. They were both of the understanding that investors today search high and low to find green projects and companies to invest in. AEF8 was of the understanding that it is not the money, nor the technique that is lagging, but the accessible projects to invests the money and the technique in. CU1 did therefore argue how they as a company has a both the possibility and the responsibility to deliver green projects to invest in, and hence facilitate the greening process of financial actors' portfolios to transform the economy.

5.2.5 Summary of identified challenges with green investments

The identified challenges presented in this subsection and how they can be considered to influence green innovation in the AEC sector is summarized in Table 4.

Table 4, Summary of the identified challenges with green investments

Identified challenges	Key factors for green business innovation
Lack of clear definition	Regime of appropriability External knowledge sources
Risk of loosing other dimensions of sustaianbility	System thinking Intra-organizational collaboration
Deprioritizing	Regime of appropriability Influences experience and external knowledge sources
Lack of arenas for making green investments	External knowledge sources

5.3 Business opportunities

When asked what services related to green investment construction companies are requesting today, both customers and employees shared a similar understanding. Due to certification system being a prerequisite to receive green loans, green services related to Miljöbyggnad, BREEAM, and LEED were mentioned by all of the respondents. Still, CU3 highlighted how these certifications up to date lack the aspect of dealing with climate risk, but how this probably will change as a result of getting aligned with the EU Taxonomy. Even if banks and financers were described to shift their focus towards other requirements than just certifications when evaluating a green investment, certified buildings were still considered important from a business perspective. It was described how the value of the building is higher if certified, and how it also creates value in form customer satisfaction.

Even if certifications today are associated with the possibility of receiving green loans from banks and access financial means, both consultants and employees at the Firm were of the understanding that capital actors are starting to change their conditions of how to classify an investment as 'green' by adding on other aspects apart from just if the building is certified or not. CU2 observed how banks today have an increasing interest in knowing how their customers are working with sustainability related risks. Consequently, it was believed by both customers and employees how the demand for green services related to analysis of and strategies for how to manage climate risks, along with climate declarations and energy performance improvements will increase.

Moreover, as a result of the implementation of the EU Taxonomy, employees at the AE Firm had observed an increasing interest for their services related to this new directive. Companies are starting to request guidance and education services, but also strategic support on how to align their business with the EU Taxonomy. It was also expressed a demand for services regarding the practical work of how to collect, analyse, and report all data needed to show Taxonomy alignment. In addition, the interviews could show how the interest in services related to circularity and refurbishment had gained more ground during the last couple of years, and some of the employees at the firm had observed how actors in the industry is starting to shift towards more circular focused products. AEF7 described how this respondent's group often are requested to design new buildings with

circularity in mind from the start, and both AEF12 and AEF10 did similarly express how refurbishment of already existing buildings are getting more focused around circularity and reuse. However, the interviews could show how there is an unsureness of how this type of services relate to green investments.

Apart from the obvious of generating profit, the employees at the firm did in general describe how one of the main business values of being able to provide green state-of-the-art services, is on one hand to attract new customers, and on the other hand to establish long term relationships. In the interviews it was found that customer relationships are important for the development of the firm's competence and services. Both AEF3 and AEF4 described how it provides the firm with the opportunity to learn from and develop solution together with the customer, which other respondent expressed as valuable in further development of individual competence. AEF10 was of the same impression, when expressing how they at this respondent's group prefer to learn and develop new tools and work processes in real-time projects. AEF6 discussed how this changing environment also fulfils personal values of the employees.

> *"What I think is fun is that with this changing landscape, changed services arise. It is a sense of added value and commitment; that one makes a difference. You can be involved in creating, inventing, and problem-solving. That is one value. Then, many of us feel a need to 'save the world'. So, on a personal level, it's fun." —AEF6*

That fact of being international and multidisciplinary, was considered one of the main strengths of the AE Firm, and the interviews recognized how intra-organizational collaboration could be of great value to improve their services further. In the interviews, both customers and employees at the firm recognized the complexity of sustainability, and how it always will be conflicting interest between the environmental, social, and economic dimensions. However, many of the employees at the firm were of the understanding that all competencies needed to deliver services where all dimensions of sustainability are considered, are available within the organization. Still, it is not yet common to combine them, expressed by AEF8.

> *"We have very strong competencies in everything from social sustainability, commercial issues and technology issues, to energy, environment and sustainability, but [we] still have a lack of generalists, with a general view and the competence to stitch all this together into a whole. We have some way to go, but pretty soon I hope we'll be there." – AEF8*

The interviews revealed that the majority of the respondents from the firm requested an increased amount of intraorganizational collaboration. This was motivated by the fact that sustainability issues are complex, and how it could be of value to increase collaboration between different disciplines and divisions. This would allow employees to share technical knowledge, but also learn how the work of different disciplines effect each other, in order to better deliver "a whole package" to their customers. AEF10 agreed and described how getting to know each other is of great importance in order to do business together. This respondent described how they therefore actively are trying to find forums where different groups can meat and strengthen the firm's services and competences together.

The identified business opportunities and how they can be considered to influence green innovation in the AEC sector is summarized in Table 5.

Table 5, Summary of green services related to green investments

Business opportunities	Key factors for green business innovation
Green services	**Activation triggers** - Stakeholder pressure - Technological shift **Social integration mechnisms** - Interorganizational collaboration **Environmental competences** **Green business advantage**

5.4 Managing green investments and sustainability

In this section, the interview findings regarding management of green investments will be presented.

5.4.1 Strategies and leadership

From the interviews, it got clear that all actors need to contribute to the process of transforming the AEC sector, and how green investments have the potential of increasing AEC companies' sustainability agenda. When asked what role leadership plays in the process of increasing green investments in the AEC sector, all of the respondents agreed that it is vital, some even discussing it as the key. Firstly, it was described how leadership at a top management level and solid, and clearly formulated corporate strategies and goals are essential to support the use of green investment, and to accomplish transformational change. It was further expressed how aligning these goals and strategies with the business' daily operations are important in order to make all members of an organization understand the importance of this transition, and how it affects their daily work, since they are a part of leading the change in the way they can. Thus, the interviews could reveal how it is essential to effectively communicate why it is of importance to work with sustainability, both in broader terms and in terms of green investments, in order to create an understanding among employees of how they can contribute.

> *"People usually talk about how the employees being the most important resource in a company, and it's exactly the same here for it to actually reach a breakthrough. That employees feel involved" – CU5*

> *"Leadership is not related to the position, but to the individual" – AEF6*

Further, several respondents expressed how a transparent leadership is of importance, and how both managers and companies need to 'walk the talk'. Both AEF1 and AEF6 the value communicating both success and difficulties that the AE Firm experiences related to the transformation of their business to its stakeholder, in order to inspire but also be considered as credible and serious about its sustainability work. This is in align with CU1 who highlighted the importance of leadership in this change:

> *"I believe that onwards, a lot of transparency and honesty is what is right. We [CU1's company] will try to work on this anyway: to just simply tell it like it is - which is good leadership - and to spread knowledge about what measures have an effect and about*

what we do. One should not say that it is sustainable if it is not. For example, it may not be green for real here and now but, it is part of a change; that we are going somewhere, and that is a point in itself to enable a greater change. It takes both leadership and courage to actually start saying things for what they are and to share" – CU1

Moreover, it was found in the interviews how the firm uses different strategies and measures to align its business with sustainability and economic. On a corporate level, AEF9 describe how the firm has set ambitions goals of reaching climate neutrality by the year of 2030, which this respondent describes affect the whole value chain of products purchased by the firm, as well as how they design their offices. Other examples on how the firm is working with green investments at an organizational level was by transforming its vehicle fleet, establishing ambitious travelling policies, and working with energy improvements, and changing consumption patterns among employees. Further, it was pointed out by the respondents how it is necessary for the firm to make green investments in its own business to develop and strengthen its services. For instance, it was mentioned how the firm invest in developing tools that can facilitate the process of communicating sustainability effects efficiently in their projects. AEF9 did also describe how the AE Firm is participating in different external forums and boards to share their knowledge with other actors in order to contribute to the transition. Further, this respondent pointed out the importance of environmental scanning to listen and understand, which also AEF7 describe to be of value. When asked to describe what role green investment will play in the further development of the firm, AEF9 gave the following answer:

"Well, it permeates… maybe not linked to green investments, but the green in some way; the underlying of a green investment permeates the whole AE Firm. We've been at the forefront continuously and for a long time, and kind of want to be that target player, and that should permeate our business. In fact, that's how we've developed it: it's not an individual island that works with these issues, but rather it should be incorporated in the whole business. There are challenges related to this, but at the same time what's road winning, because that's how we can reach the full potential of influencing all our projects, which are many. So, if we can achieve this, then we get a completely different strength, compared to if it was just a small part [of the organization] who worked [with this]. So, I would say that's probably the most important thing. – AEF9

5.4.2 Raise internal competence across the organization

Several of the interviews shared the same perception of their colleagues being dedicated to contributing to the sustainability transition. In fact, some respondents described how its outspoken sustainability agenda is one of the reasons to why people choose to work at the firm. The AE Firm interviewees gave examples of how the firm has different types of communication channels, where employees easily can interact with each other, share knowledge, but also receive organizational news in an efficient way. Also, it was described by some of the respondents how the firm works actively on increasing international collaboration to make use of the different competences.

However, even if the competence level regarding sustainability at the firm was described as high and divers, all respondents acknowledged the essential need for constant development of its services, but not the least the induvial competences among its employees, both regarding the broad aspects of sustainability, as well as green

investment. From the interviews, it got clear that the firm is working actively to increase the competence among its employees to strengthen project performance. AEF10 mention how they at this respondent's divisions work with workshops and development programs to increase the competences related to sustainability among colleagues. Also, they make use of the sustainability coach available at the firm to increase the competence and awareness among AEF10's colleagues. AEF7 gave another example of how this respondent's group, apart from having group-specific goals related to sustainability, work with green investments:

> *"We don't call it green investments, but sustainability. So, when working with sustainability /…/ we have gathered a group that moves us forwards in terms of competences. So, we have created a sustainability network, you could say, a sustainability group /…/ they perform environmental scanning, they produce some templates, cheat sheets, and spread the good stuff, so to speak. Then do they also get involved in the projects where we need to do different things related to sustainability" – AEF7*

It was reflected in the interviews how a consultant's will and interest to influence a project and increase its sustainability focus, partly is related to personal traits and interests. It was found that several of the respondents believed how increased knowledge and understanding of how the individual work among consultants at the AE Firm relates to the broad aspect of sustainability and green investments are of high importance. Regarding green investments and financing, AEF6 is of the understanding that it still is on a very strategic level, making it vague and hard for all consultant to understand how it relates to their daily work. AEF12 gave an example on why it is important to work with competence development to better motivate and work with green investments:

> *"You need to move forward; develop interest and educate all the time, I think, because it's changing at a fast pace. What I looked at 2 years ago, is not relevant around this particular area" – AEF12*

5.4.3 Influence customers

From the interviews it appeared that all the respondents from the firm acknowledged how it is in their project where they can have an impact and accomplish real change, and thus reach the firm's corporate goal of actively contributing to the transition, expressed by AEF9 and AEF4.

> *"But it's like I said before really, everything we can do greener and better, we'll help somewhere. And the more projects we get, the more we can be involved and make an impact. – AEF9*

> *"without our customers, no projects and without any projects, no impact" – AEF4*

It was reflected in the interviews how the general understanding among the employees at the firm is that as consultants, they are responsible to influence the project in the ways possible. Consequently, all respondents agreed on how they as consultants have the responsibility to advice, guide, and inform their customer of how to make a project even more sustainable. To achieve this, the general underlying view among the respondents is that as consultants, they need to be knowledgeable, communicative, but also brave and bold in their customer relations. This was elaborated on by AEF7:

"We have worked a lot with the competence part, but it needs to be balanced with the sales part in some way: competence, sales and courage. So that when you sit there with the customer, you dare to admit that 'I've never done this before, but I've heard that we can do this'; to dare taking that initiative and look for information" -AEF7

AEF5 describe how they both as individuals and as a firm needs to try innovative solutions, and to walk in the front: one does not necessarily know what the best solution is, but one needs to dare to try to find out together with the customer. Consequently, the interviews highlighted the importance of good and ongoing customer communication. It was expressed that by asking the customer question, for instance about corporate or strategic goals, if there are any specific demands from their investors, how the customer would like to incorporate sustainability in the project and so forth, it is possible to provide additional or optional alternative. AEF12 were also of the understanding that as consultants, they should not be afraid to challenges the customer to think differently, and AEF8 further expressed how they should not hesitate to involve other colleagues if seeing an opportunity to do so. Still, it was expressed in the interviews how the possibility to influence a project and its sustainability agenda, decreases the later the AE Firm gets involved in the project. Therefore, several respondents pointed out the benefits of starting to communicate and get involved with the customer as early as possible. AEF12 described how this gives them as consultants the possibility to define project specific goals etcetera., and this respondent pointed out the importance of letting these goals permeate the whole process.

Furthermore, the interviews revealed how it always is beneficial to be able to provide a concrete motivation to why a proposed more sustainable option or alternative can be considered a more beneficial investment. Being able to show on previous successful cases, was identified in the interviews as one way to effectively communicate sustainability advantages. Still, both AEF12 and AEF10 pointed out the uniqueness of each project, which is important to keep in mind when comparing one project with another. The interviewees did further express how strategies linking decreased environmental impact with cost savings, for instance CO_2-reduction per SEK invested, can be an efficient way of increasing customer interest. In addition, it was described by interviewees how it is possible to calculate an economic payback of energy efficiency improvements, linking sustainability with economics. Still, AEF12 highlighted the importance of also to bring up the softer values that can be generated from a green investment, for instance change in mobility patterns.

Another strategy discussed of how to influence a customer to make green investments in more sustainable options, were to put light on the financial sector to describe the possible risks of not being green (see section 5.1.3). According to AEF6, this can also be a way to increase the understanding of why green investments are necessary to make. Investments in strengthened ecosystem services has traditionally not been a top priority in the AEC sector, due to the fact of being hard to prove if they will result in any economic advantages - because it is hard to know what a bumble bee is worth as AEF6 described it. However, this respondent described how the ongoing climate change is a huge business risk for capital actors, e.g., banks, since they are involved in industries depending on functional ecosystems, e.g., forestry and agriculture. Hence, if not being able to mitigate climate change, this will have a negative impact on those industries, resulting in potential financial instability. Thus, AEF6 has observed that by linking green investments to the mitigation of future financial risks, can be a way to influence and increase the

understanding about the necessity of green investments among customers. Also, CU4 highlighted how investments in green infrastructure can increase the wellbeing among citizens and thus result in increased customer satisfaction, at the same time as supporting ecosystem services.

In summary, many of the respondents were of the understanding that the abilities needed to influence a customer are leadership capabilities, and how this is essential in the process of increasing the interest in green investment.

> *Yes, but I would say that it is absolutely crucial. You have to believe in yourself and then you have to lead based on that. And what kind of leadership… it's about daring to take the lead and be brave. Also, it's about being curious and to step into the unknown. That's how courage comes in. So, a courageous leadership that dares to challenge, but also listen in and kind of understand - AEF9*

5.4.4 Summary of how to manage green investments and sustainability

The identified factors of how to manage green investments and sustainability, and how this can be considered to influence green innovation in the AEC sector is summarized in Table 6.

Table 6, Summary of how to manage green investments and sustainability

Managing green investments and sustainability	Key factors for green business innovation
Strategies and leadership	**Social integration mechnaisms** - Top management support - Cooperative organizational behaviour **Environmental capabilties** - Stakeholder management (transparancy, behavioural change) - Environmental management (corporate goals and strategies) **Responsible management competences** - Interact with stakeholders (to interact) - Personal comittment (to be)
Raise internal competences across the organization	**Social integration mechanisms** - Internal communication and information sharing **Recognizing the value** **Experience** **External knowledge soruces** **Environmental capabilties** - Change of practises, activities and routines **Environmental competences** - System thinking - Future orientation
Influence customers	**Responsible management competences** - Technical competence (to know) - Communication skills (to interact) - Personal comittment (to be) **Environmental competences** - System thinking - Entrepreneurial thniking - Inter- and intra orgaizational collaboration - Interactive problem-solving skills

6. DISCUSSION

In this chapter, the interview findings will be interpreted, and discussed in relation to the background literature, and the thesis' theoretical framework, summarized in Figure 7. The discussion is divided into two sections based on the research questions. Section 6.1 covers how to define green investments, and their impact on AEC organizations. Section 6.2 duscusses how a consultancy firm in the AEC sector may improve their work processes and services based on the four competence categories 'to know' and 'to do', and 'to interact' and 'to be'.

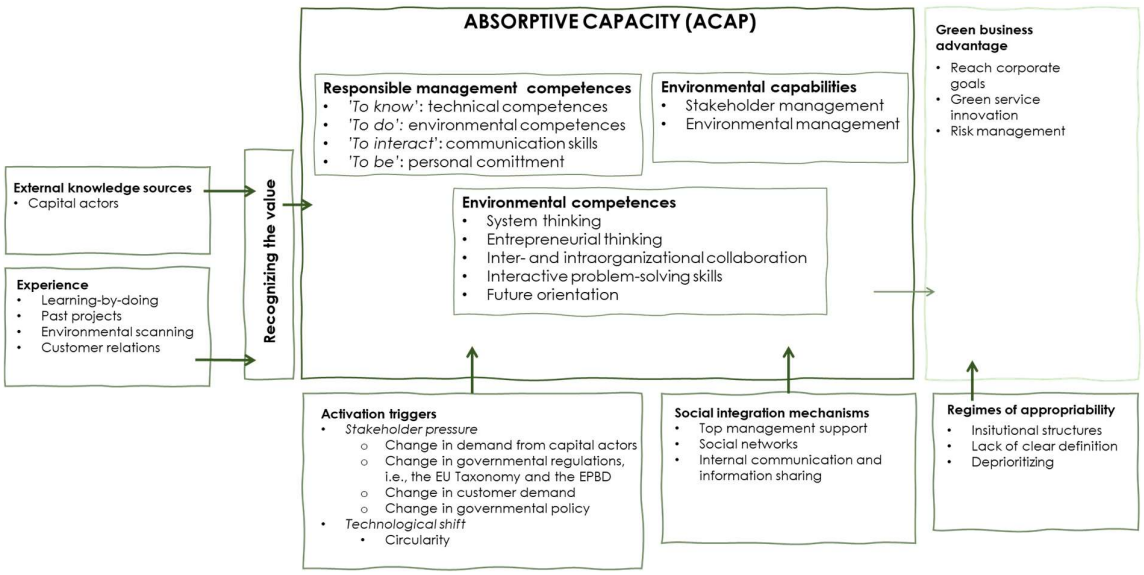

Figure 7, Summary and interpretation of the interview findings in relation to the theoretical framework

6.1 What is a green investment and how do green investments influence AEC organizations

In the following section, the first research question will be discussed in relation to the theory presented in the background chapter, and the thesis' theoretical framework.

6.1.1 Defining what is green: an issue influx

One of the main challenges with green investments identified in this study is the lack of a clear definition. Apart from identifying different ways of making the concept more concrete, this study also implies how the lack of a set definition can be considered an advantage. It was highlighted in the interviews that the EU Taxonomy and its classification systems has contributed with a common language of how to define a green economic investment. Still, the study identifies a request for clearer directives from capital actors of how companies are supposed to report on their economic activities, since this was considered to be of high value to increase transparency and decrease the risk for green washing. Consequently, this implies that banks, financers, and investors have the potential to clarify the concept of green investments even further and support the transformation of the industry, for instance, by communicating effectively on what basis they evaluate an investment as green. Also, construction companies could possibly benefit from increasing their interaction with capital actors, in order to gain valuable external

knowledge about green investments. In addition, external knowledge is recognized as a predictor for green business innovation (Zahra & George, 2002).

According to the interview findings, a green investment is considered to have an environmental orientation and is consequently not considered the same as a sustainable investment. However, this can be argued to just be one side of the coin and it is therefore worth questioning – as some respondents did - why a green investment should not be able to support the social and economic dimension of sustainability. Even if the basis of the investment is 'green', i.e., environmentally focused, it may if the right competences are available become sustainable and support all three dimensions of sustainability. Therefore, it is possible to argue that a green investment should not be limited to just environmental sustainability, since it has the potential to increase the business focus on other sustainability issues. This can be considered to be of high importance to keep in mind, because as stated in the introduction of this thesis, sustainability is wicked, and it changes over time. Being able to look at investments from a holistic perspective, and proactively try to add other aspects of sustainability to a green investment, will be beneficial for both companies and the transition. As stated in the interviews: what is green today may not be green tomorrow. Tomorrow green may be sustainable.

6.1.2 Green investments' influence on AEC organizations' businesses

According to the interview findings, it appears like construction organizations expect to capture value from making a green investment in terms of economic benefits, i.e., lower operational costs, and the possibility of accessing green loans and financial means. Green investments do also have the potential to generate an improved market position and validity among capital actors and customers, as a result of these stakeholders' increased sustainability focus and awareness. Therefore, as mentioned in the interviews, green investments should be treated and managed the same way as a normal investment, hence, to deliver positive returns and to reduce risks, alike Reinhardt's (1999) claim. In fact, it appears that green investments will possibly become a natural part of construction companies risk management strategy, since the ongoing shift in the AEC business environment implies how not being green in a nearby future will be considered a business risk.

Yet, based on the interview findings, it appears that investments in sustainability initiatives still are deprioritized on a project level due to economic reasons, or a lack of interest and/or knowledge about sustainability issues, just as claimed by Mokhlesian and Holmén (2012), Sadri et al. (2022), and Toppinen (2018). Even if proved to be able to generate long- term value that can be beneficial from a business, and not the least sustainability perspective, investments in green construction may still not be considered worth the initial costs. Still, the possible economic values of sustainability initiatives can be argued to get increasingly clear, partly as a result of the implementation if the EU Taxonomy. Consequently, prospects are that actors who previously have not valued this type of initiatives from a business perspective may now start to understand the benefits and potential advantages of being green.

Further, the interview findings indicate that construction companies have raised their request for green services, such as services related to green buildings certificates, and the EU Taxonomy, e.g., how to align and report on this directive. In addition, due to the environmental objectives of the EU Taxonomy of climate change mitigation and adaption,

as well an increased demand from capital actors of how companies manage climate risks, the industry will probably experience an increased interest in green services of how to deal with these issues. Furthermore, the industry seems to experience a technical shift, due to increased interest in circularity and reuse, and how this is recognized as a way to decrease the built environments negative impact. Since one of the environmental objectives of the EU Taxonomy is whether it contributes to the transition to a circular economy, the request for services linking circularity with green investments will probably increase. In addition, construction companies will need to increase their focus on biodiversity and ecosystem services. As a consequence, it is possible to argue that the the EU Taxonomy with advantage can be used as a way to highlight the importance of different environmental sustainability initiatives, that traditionally may not have been a top priority among construction companies.

This study further confirms Gluch et al.'s (2009) claim of stakeholder pressure being one of the main activation triggers for green innovation in the construction industry. According to the interview findings, it appears that the change in demand among capital actors in combination with the change in directives on an EU level, i.e., the implementation of the EU Taxonomy and the proposed revision of the EPBD, are two profound activation triggers for green innovation. Thus, as a result of how capital actors now are treating environmental issues as business risk, it is possible to claim that bumble bees are increasing in value. As illustrated in Figure 7, customer demand could be identified as an additional activation trigger for green business innovation in the AEC sector. Still, this trigger seems to be of less importance regarding how construction companies, i.e., customers to the AE Firm, work with green investments. Thus, the result of this study partly contradicts Bossink's (2011) claim of customer demand being the main driver for business innovation in construction companies. Nonetheless, this study point out how the end customers are important actors to increase the use of sustainable construction and green services, meaning their influence must not be neglected (Mokhlesian & Holmén, 2012; Toppinen et al., 2018).

Another aspect worth noting is that it appears that green innovation of construction companies is not mainly triggered by governmental policies. Governmental policy instruments were recognized as an important steering mechanism to increase the sustainability focus among construction organizations and to provide the industry with long-term stability. However, based on the result of this study, the Swedish legislation is up to date considered to move in a slower pace compared to both the industry and the change in EU policies. It can therefore be argued that national governmental policy instruments rather belong to the regime of appropriability than works as an activation trigger, at least when it comes to green innovation related to green investments. This is motivated by how a lack of governmental demands partly may hamper green innovation of construction businesses, since some construction companies only do the sustainability work that is just about necessary. Yet, AEC companies will need to innovate their businesses independently of Swedish governmental policy instruments, due to the shift among capital actors and change in directives on an EU level. Thus, it is possible to argue that green investments have the potential to accelerate the sustainability agenda of AEC companies, and be considered important in the process of transforming "the demand for sustainable development into an opportunity" (Bourdeau, 1999, p. 364).

This study further implies that AEC companies will need to align their business to the changing business environment and, as stated by Brønn and Brønn (2019), adopt new mental models of how to manage the question of sustainability. If not, they face the risk of being outdone, as expressed by McKinsey & Company (2020). Hence, the change in business environment may result in organizational transformation, since sustainability will need to be incorporated in in construction companies' corporate goals and strategies. Still, the interview findings highlights the importance of making organizational members understand the reason for the change, and how corporate goals relate to the company's everyday activities. In order to accomplish a sustainable shift, employees need to be more or less committed to participate and lead the change. Therefore, well established, and effective social integration mechanisms, such as management support, communication forums etcetera, will be essential to create a common understanding and comprehension across the organization. This is alike Zahra and George's (2002) description of how social integration mechanisms are essential in the process of creating a mutual understanding among organizational members. Further, environmental organizational capabilities, e.g., environmental and stakeholder management, will be important in order to transparently communicate the sustainability work of the company to its stakeholders, as well as to align and manage its operations in relation to the natural environment (Dzhengiz & Niesten, 2020).

6.2 How can a consultancy firm in the AEC sector improve their work processes and services

Based on the discussion in the previous chapter, this study implies a potential for green business innovation of the AE Firm's green services, and the possibility of gaining a business advantage. Change in customer demand can be argued as the main activation trigger for green innovation of consultancy firms such as the AE Firm. Also, according to the interview findings, it is in projects were the firm has the greatest potential to influence and contribute to the transition, which consequently puts high pressure on the individual consultant. Employees at the firm were described to need to possess the abilities of being knowledgeable, communicative, and brave in order to influence the sustainability performance of projects, and to reach the AE Firm's corporate goals of constributing to the sustainability transition. These abilities will be further discussed in the following two sections.

6.2.1 'To know' and 'to do'

The first ability of being knowledgeable can be discussed in relation to Laasch and Conaway's (2015) two first competences of a responsible manager, hence, 'to know' and 'to do'. In order to influence the sustainability agenda of a project and to motivate the future benefits of making green investments, a consultant need to have the technical and domain-specific knowledge on sustainability in the construction industry. From the interview findings, it is possible to argue that the AE Firm is working actively on increasing the technical competence among its employees, for instance in terms training and education, i.e., environmental function capabilities. Further, it appears that the firm has well-established social integration mechanisms, e.g., social networks and management support, that can facilitate knowledge sharing among employees and support the development of both individual and organizational competencies.

Still, in the interviews it was expressed how green investments in general are considered complex and to be of a strategic nature for many consultants at the firm. Based on how

green investments influence the AEC business environment and how it can be considered a tool for how to motivate green construction, it can be argued that the AE Firm would benefit from raising the general knowledge about this topic among its employees. For instance, if being aware of how green investments can be considered a tool to minimize future business risks, this can, as described in the interview findings, be an efficient way to motivate construction companies that are less interested in sustainable initiatives why green investments are valuable from a long-term business perspective.

Moreover, according to Todorova and Durisin (2007), individual competences are important in the process of acquiring new knowledge from external knowledge sources, and experience. By raising the general competences regarding both the broad aspects of sustainability as well as green investments, it is possible to argue that employees will be able to better recognize the value of new knowledge that may contribute to the further improvement of the AE Firm's services.

Based on this study, it can further be argued to be of value to discuss the ability of being knowledgeable in relation to the competence 'to do', and more precisely in terms of different attributes of environmental competences as described by Dzhengiz & Niesten (2020). It appears that the ability of applying system thinking will be of high importance in the process of increasing the sustainability focus of construction projects and motivate green investments. As described in section 3.2, system thinking is about understanding how a complex phenomenon such as sustainability cannot be looked at independently, since it is dynamic and interrelated in a complex system. This highlights the necessity of, just as claimed in in the interviews, broadening the concept of green investments to reach its full potential of generating both short- and long-term values. As pointed out by the respondents, there will always be conflicting interest among the different dimensions, and system thinking will be of high value to manage this. Also, it can be argued as important to balance the managerial equilibrium of the sustainability triad as defined by Brønn and Brønn (2019).

In order to broaden the concept of green investments in practice, consultant will also need to be able to understand and see the value of trans- and interdisciplinary work, annother ability pointed out by Dzhengiz & Niesten (2020). It is possibly to claim that this will facilitate the work of managing sustainability in projects, and thus better motivate the future benefits of making green investments in sustainability initiatives. According to the interview findings, it appears that the AE Firm has a potential to provide the industry with green services where not only the environmental dimension of sustainability is taken into consideration. Still, this will require consultants to be acquainted with colleagues at other groups and divisions in order to identify how the sustainability performance of a projects can be increased even further. Consequently, this highlights the importance of the efforts that up to date are being made at the firm, aiming to increase understanding among employees how the different disciplines can work together.

Moreover, it appears that entrepreneurial thinking, described by Dzhengiz & Niesten (2020) as the ability of managing environmental issues in a creative and innovative way, is important. According to the interview findings, consultants at the AE Firm need to dare to challenges the customer's initial approach by suggesting options of how to make a project even more sustainable. It is described how they as a company will need to be innovative and dare to try out new solutions, in order to create as much value as possible.

This is alike Lambrecht et al.'s (2021) claim of how it is necessary to challenge the market in order to innovate and transform the construction industry. This indicates that consultants may need to search the market for new information on how to deal and manage the specific issue to realize the suggested alternative option. Apart from having the possibility to strengthen the sustainability agenda of a single project, this process will be of value for further development of the firm's services. This is motivated by the fact that experience in term of external search and environmental scanning is important in order to acquire new and valuable knowledge (Zahra & George, 2002).

It can also be argued that it is valuable to build well-established and strong customer relationship. Respondents from the firm described how they by building long-term relationships with customers, has the possibility to learn from each other and innovate together in projects, which aligns with the literature. According to Dzhengiz & Niesten (2020), it is possible to increase environmental sustainability by combining different actors' competences and know-how through interactive problem-solving. Bossink (2011) further claim that interorganizational collaboration is of value to increase the environmental performance of the construction sector in general (Bossink, 2011). In addition, customer relations are also a way to acquire new knowledge (Zahra & George, 2002), and are hence important knowledge sources for green business innovation (Gluch et al., 2009). Thus, the ability of interactive problem-solving skills among consultants make it possible to not only increase the sustainability agenda of a specific projects, but can also provide the AE Firm with valuable experience and external knowledge of how to better motivate the future benefits of green investments.

This study further highlights the importance of formulating clear goals and strategies of a project to strengthen its sustainability agenda. This aligns with the ability of a consultant being future oriented, hence being able to deal with uncertainties, plans end expectations (Dzhengiz & Niesten, 2020). This can be argued to be of extra value when dealing with green investments, since they - according to the interview findings – often are perceived as complex and abstract among construction practitioners. However, it is pointed out how this can be mitigated by defining a green investment in the specific context. The way a green investment is defined by the EU Taxonomy may not be the best suited definition, thus it can be of value to define what is green based on project specific goals, KPIs etcetera. Yet, this highlights the importance of early involvement of the AE Firm's consultants in projects, just as pointed out by the respondents.

6.2.2 'To interact' and 'to be'

The third responsible management competence as defined by Laasch and Conaway's (2015) is 'to interact', which is focused on a manger's social competences. Even if recognized in the interviews that communication skills partly are individual traits, it can be argued that consultant's interaction skills can be strengthened if he or she is knowledgeable and has access to suitable capabilities and tools.

The general understanding among the interviewed employees of the AE Firm, is that they as consultants have the responsibility to guide and inform their customer of how to improve the sustainability performance of a project. This is aligned with the literature, which claim that one of the reasons to why sustainable construction is deprioritized, is due to limited consciousness and knowledge among clients, contractors and consumers (Mokhlesian & Holmén, 2012; Sadri et al., 2022; Toppinen et al., 2018). Consequently, this

study highlights how consultants need to interact and communicate continuously with its customer in order to manage sustainability in projects. Further, the interviewees did also describe how it is important to be able to describe concrete advantages with alternative options, often in money terms, hence reduced cost per SEK. This does in turn point out the necessity of continuous development of the firm's capabilities, in order to ensure that the tools needed to illustrate these advantages are available and well established. Also, the social competences of the AE Firm's employees are needed to develop long-term relationships with its customers, which was recognized valuable for the development of the firm's competences and capabilities (see Section 6.2.1).

Moreover, it can be argued that the social competence of a consultant is a tool to manage the regime of appropriability related to customer demand. If being able to efficiently communicate the advantages with green investments in sustainability initiatives and increase both the understanding and interest in green services among customers, this can be a way to mitigate the risk of green innovation not paying off.

The final competence pointed out as essential for responsible managers is the ability of being committed and personally engaged in sustainability issues (Laasch & Conaway, 2015). This can in turn be claimed as essential in order for consultants and mangers to be brave in their customer relations. Based on the interview findings, it can be argued that everyone has a responsibility to take part in the transformation of the AEC industry; leadership is needed on all levels since all actions matter. By being personally committed to the process of transforming the industry in combination with having the knowledge and the tools to motivate the future benefits of green investments and green construction, individuals may dare to take on a leadership role in this change process, and to increase the number of green investments in construction projects.

7. CONCLUSIONS

In this section, the two research questions presented in section 1.2 will be answered.

7.1 What is a green investment and how do green investments influence AEC organizations?

According to this study, a green investment is multidimensional and has the potential to create and capture both short- and long-term values. On one hand, green investment can be defined in terms of concrete activities, e.g., actions improving the energy performance of a building, or green buildings certification. These types of investments are indented to deliver business values in terms of a strengthened market position, and economic benefits in terms of reduced costs and access to green financial means. In addition, these activities can generate more long-term value in terms of reducing the building's negative environmental impact, and strengthened ecosystem service, thus reduce environmental risks and contribute to the sustainability transition. On the other hand, green investments can support sustainable behavior among employees or citizens, by increasing sustainability awareness with the potential to accomplish a change of mental models.

Moreover, this study concludes that even if being environmentally focused today, green investments have the potential to put light on other sustainability dimensions, increasing both the interest in and understanding for the wickedness of sustainability. While the study puts light on the business risk of not being green, it also highlights the potential business advantage for those companies who chose to innovate and proactively incorporate sustainability at the core of their business. Just as stated in the discussion, what is green today may not be green tomorrow, and consequently AEC organizations will need to both challenge the market and optimize their businesses in order to balance the managerial equilibrium of the sustainability triad.

It can further be concluded that the main activation triggers for green innovation of construction companies are change in stakeholder demand, and more precisely from capital actors and change in directives on and EU level. Consequently, companies in the sector will need to learn how to adapt, and transform their businesses in order to minimize future business risks. Thus, green investments will possibly become an essential part of AEC organization's risk management strategy, and can also function as a tool to adapt to this new business environment with an increased focus on sustainability.

Based on this thesis, it can be concluded that green investment up to date influence the AEC sector, and how this influence most probably will increase due to the way sustainability and finances are increasingly getting interlaced, due to the change in directives on an EU level and the change in demand among capital actors. Therefore, green investments can be considered an activation trigger for the transformation towards sustainable business models in the AEC industry.

7.2 How can a consultancy firm in the AEC sector improve its work to better manage, value and motivate future benefits of green investments?

According to this study, it can be concluded that in order to better manage, value, and motivate the future benefits of green investments and sustainability initiatives, consultancy firms in the AEC sector providing green services need to ensure that environmental capabilities, for instance education of employees, and corporate goals and

strategies, as well as social integration mechanisms, e.g., social networks and management support, are well established. Further, as pointed out in the theoretical framework of this thesis, external knowledge sources and experience are of high value to develop and strengthen consultancy firm's green services, which in turn may have the potential to result in a green business advantage. Therefore, consultancy firms should with advantage increase their interorganizational knowledge sources, in order to better innovate their services and businesses, but also to better manage the regime of appropriability for green innovation, i.e., the risk of innovation initiatives not paying off. Understanding the environment in which the firm operates is essential to gain a business advantage and to create sustainable value for its stakeholders.

Finally, this study highlights how consultants possessing responsible management and environmental competences can increase the sustainability focus in construction projects, and better motivate the future benefits of green investments. If having the right technical knowledge, the abilities of e.g., system thinking, and entrepreneurial thinking, in combination with social interaction skills and personal commitment, consultant have a big opportunity to contribute to transformation of the AEC industry. Consequently, consultancy firms need to work actively to raise internal competences among its employees, but also to facilitate and encourage intraorganizational collaboration, in order to provide green services with a more holistic way of dealing with sustainability issues. As pointed out in this thesis' findings: every action matter, and therefore, everyone have a responsibility to lead change and to create and capture long-term sustainable value.

So, what is a bumble be worth? Maybe the real question to ask is what is our future worth? The sustainability transition and the transformation of the AEC sector is necessary to ensure a sustainable future, and as stated in this thesis, green investments can be considered a tool and a catalyst in this process. Investments needs to not only support organizational and economic growth, but also aim to generate long-term values, such as strengthened ecosystem services and to reduce climate risks. Thus, it is necessary to shift the managerial equilibrium to the centre of the sustainability triad. Those companies understanding the equation of how to balance sustainability with economic growth will be able to innovate its business and gain future, green business advantages, at the same time as creating and capturing sustainable value.

8. RECOMMENDATIONS

Based on the conclusions of this study, recommendations for both consultancy firms in the AEC sector, as well as recommendations for future research have been identified.

8.1 Recommendations for consultancy firms in the AEC sector

- Encourage both intra- and inter-organizational collaboration for further development of a firm's green services.
- Ensure forums allowing employees to learn about and relate green investments to their individual works.
- Value both external knowledge sources and experiences in order to better learn how to manage, value, and motivate the future benefits of green investements and green construction.
- Investigate how to prove concrete economic benefits of green investments in activities aiming to create more monetary values, e.g., strengthened ecosystem services, or social sustainability, by using tangible measures.

8.2 Recommendations for future research

- Based on the result of this study, it is evident that in order to manage and motivate green investments in sustainability initiatives, involved actors need to understand the concept in order to see its potential. Therefore, it would be interesting to investigate green investments through the lens of sensemaking and sense giving.
- Based on the previous recommendation, it would be interesting to investigate what forums are the most efficient to use when creating a common understanding about green investments and sustainability among organizational members, and how these should be designed and structures.
- It would further be interesting and valuable to investigate green investments' potential to strengthen social sustainability, and how this would be managed.
- Lastly, it would be interesting to look beyond the borders of the European Union, and investigate green investments from a global perspective, e.g., how the EU Taxonomy will affect European companies businesses on the global market.

REFERENCES

Abuzeinab, A., Arif, M., Qadri, M. A., & Kulonda, D. (2018). Green business models in the construction sector: An analysis of outcomes and benefits. *Construction Innovation*, *18*(1), 20–42. https://doi.org/10.1108/CI-07-2016-0041.

Apel, F., Boland, B., de la Motte, H., Moore, A., Reiter, S., & Sjödin, E. (2022, November 2). *Accelerating green growth in built environment | McKinsey*. Article. https://www.mckinsey.com/capabilities/operations/our-insights/accelerating-green-growth-in-the-built-environment

Bell, E., Harley, B., & Bryman, A. (2022). *Business research methods (6thedition).* Oxford University Press.

Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. In *Journal of Cleaner Production* (Vol. 65, pp. 42–56). https://doi.org/10.1016/j.jclepro.2013.11.039

Bossink, B. (2011). *Managing Environmentally Sustaianble Innvation - Insights from the Construction Industry*. Taylor & Fracnis.

Bourdeau, L. (1999). Sustainable development and the future of construction: A comparison of visions from various countries. *Building Research and Information*, *27*(6), 354–366. https://doi.org/10.1080/096132199369183

Boverket. (n.d.). *Syftet med att klimatdeklarera byggnader - Klimatdeklaration*. Retrieved 24 February 2023, from https://www.boverket.se/sv/klimatdeklaration/om-klimatdeklaration/syfte/

BRE Group. (n.d.). *BREEAM*. Retrieved 6 June 2023 from, https://bregroup.com/products/breeam/.

Bryman, A., & Bell., E. (2017). Företagsekonomiska forskningsmetoder (tredje upplagan). Liber AB.

Brønn, C., & Brønn, P. S. (2019). *Sustainability A wicked problem needing new perspectives*.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. In *Quarterly* (Vol. 35, Issue 1).

Corbett, J., Webster, J., & Jenkin, T. A. (2018). Unmasking corporate sustainability at the project level: Exploring the influence of institutional logics and individual agency. *Journal of Business Ethics*, *147*(2), 261–286. https://doi.org/10.1007/s10551-015-2945-1

Council of the EU. (n.d.). *'Fit for 55': Council agrees on stricter rules for energy performance of buildings - Consilium*. Retrieved 9 March 2023, from https://www.consilium.europa.eu/en/press/press-releases/2022/10/25/fit-for-55-council-agrees-on-stricter-rules-for-energy-performance-of-buildings/

Christensen, C., Bower, J. (1996). Customer power, strategic investment, and the failure of leading firms. *Strategic Management Journal, 17(3), 197-218.* DOI: 10.1002/(sici)1097-0266(199603)17:3<197::aid-smj804>3.0.co;2-u.

Dzhengiz, T., & Niesten, E. (2020). Competences for Environmental Sustainability: A Systematic Review on the Impact of Absorptive Capacity and Capabilities. *Journal of Business Ethics*, *162*(4), 881–906. https://doi.org/10.1007/s10551-019-04360-z

EU Technical expert group on sustainable finance. (2020). *Taxonomy: Final report of the Technical Expert Group on Sustainable Finance*. Retrieved 9 june 2023, from https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en.

European Commission. (n.d.-a). *FAQ: What is the EU Taxonomy and how will it work in practice?* Retrieved 9 june 2023, from https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en.
European Commission. (n.d.-b). *Corporate sustainability reporting*. Retrieved 6 June 2023, from https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en
European Commission. (n.d.-c). *EU taxonomy for sustainable activities*. Retrieved 24 February 2023, from https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en#what
European Commission. (n.d., -d). *Level(s): European framewoek for sustainable buildings*. Retrieved 6 June 2023, from https://environment.ec.europa.eu/topics/circular-economy/levels_en.
European Commission. (n.d.-f). *Energy performance of buildings directive*. Retrieved 24 February 2023, from https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en.
European Commission. (2019). *Factsheet: Financing sustainable growth*. Retrieved 6 June 2023, from https://finance.ec.europa.eu/system/files/2020-01/200108-financing-sustainable-growth-factsheet_en.pdf
European Commission. (2021). *Annex 2 to the Commission Delegated Regulation (EU).* Brussels, 4.6.2021, C(2021) 2800 final.
Ferdig, M.A. (2007). Sustainability Leadership: Co-creating a Sustainable Future. *Journal of Change Management, 7(1), 25-35.* DOI: 10.1080/14697010701233809.
Filho, M. A. L. C., Pedron, C. D., & Ruas, R. L. (2021). What's going on in absorptive capacity studies? Research fronts on organisational knowledge absorption. *International Journal of Innovation Management*, *25*(5). https://doi.org/10.1142/S1363919621500560
Gluch, P., & Baumann, H. (2004). The life cycle costing (LCC) approach: A conceptual discussion of its usefulness for environmental decision-making. *Building and Environment*, *39*(5), 571–580. https://doi.org/10.1016/j.buildenv.2003.10.008
Kaiser, K. (2009). Protecting Respondent Confidentiality in Qualitative Research. *Qualitative Health Research, 19(11), 1632-1641.* DOI: 10.1177/1049732309350879.
Laasch, O., & Conaway, R.N. (2015). *Principles of responsible management: Glocal sustainability, responsibility, and ethics*. Cengage Learning.
Lambrechts, W., Mitchell, A., Lemon, M., Mazhar, M. U., Ooms, W., & van Heerde, R. (2021). The transition of dutch social housing corporations to sustainable business models for new buildings and retrofits. *Energies*, *14*(3). https://doi.org/10.3390/en14030631
McKinsey & Company. (2020). *The next normal in construction Executive summary*. Retrieved 9 june 2023, from https://www.mckinsey.com/~/media/mckinsey/industries/capital%20projects%20and%20infrastructure/our%20insights/the%20next%20normal%20in%20construction/executive-summary_the-next-normal-in-construction.pdf
McKinsey & Company. (2021). *Economic growth for the good of all: Sustainable and inclusive*. Retrieved 6 June 2023 from https://www.mckinsey.com/featured-insights/sustainable-inclusive-growth/our-future-lives-and-livelihoods-sustainable-and-inclusive-and-growing.
Mokhlesian, S., & Holmén, M. (2012). Business model changes and green construction processes. *Construction Management and Economics*, *30*(9), 761–775. https://doi.org/10.1080/01446193.2012.694457.

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers and Challengers.* John Wiley & Sons Inc.
Pekuri, A., Suvanto, M., Haapasalo, H., & Pekuri, L. (2014). Managing value creation: The business model approach in construction. *International Journal of Business Innovation and Research*, *8*(1), 36–51. https://doi.org/10.1504/IJBIR.2014.058045/ASSET/IMAGES/LARGE/IJBIR_58045_FIG2.JPEG
Sadri, H., Pourbagheri, P., & Yitmen, I. (2022). Towards the implications of Boverket's climate declaration act for sustainability indices in the Swedish construction industry. *Building and Environment*, *207*. https://doi.org/10.1016/j.buildenv.2021.108446
Schoenmaekers, S. (2023). The influence of sustainable reporting obligations on public purchasing. *ERA Forum*. https://doi.org/10.1007/s12027-022-00726-5
Sweden Green Building Council. (n.d., -a). *Certifiering: Nyckeln till ett hållbart samhällsbygge*. Retrieved 6 June 2023, from https://www.sgbc.se/certifiering/
Sweden Green Building Council. (n.d., -b). *Vad är Miljöbyggnad?.* Retrieved 6 June 2023, from https://www.sgbc.se/certifiering/miljobyggnad/vad-ar-miljobyggnad/.
Sweden Green Building Council. (n.d., -c). *Vad är LEED?.* Retrieved 6 June 2023, from https://www.sgbc.se/certifiering/leed/vad-ar-leed/.
Sweden Green Building Council. (n.d., -d). *Vad är WELL Building Standard?* Retrieved 6 June 2023, from https://www.sgbc.se/utveckling/well-building-standard-i-sverige/vad-ar-well-building-standard/.
Sweden Green Building Council. (2023). *Vad är BREEAM-SE?*. Retrieved 6 June 2023, from https://www.sgbc.se/certifiering/breeam-se/vad-ar-breeam-se/.
Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, *43*(2–3), 172–194. https://doi.org/10.1016/j.lrp.2009.07.003
Todorova, G., & Durisin, B. (2007). Absorptive capacity: valuing a reconceptualization. *Academy of management Review, 32(3),* 774-786. https://www.jstor.org/stable/20159334.
Toppinen, A., Autio, M., Sauru, M., & Berghäll, S. (2018). Sustainability-driven new business models in wood construction towards 2030. In *World Sustainability Series* (pp. 499–516). Springer. https://doi.org/10.1007/978-3-319-73028-8_25
Uppstill-Goddard, J., Glass, J., Dainty, A., & Nicholson, I. (2016). Implementing sustainability in small and medium-sized construction firms: The role of absorptive capacity. *Engineering Construction and Architecture Management, 23(4),* 407-427. DOI 10.1108/ECAM-01-2015-0015.
Velte, P. (2023). Which institutional investors drive corporate sustainability? A systematic literature review. *Business Strategy and the Environment*, *32*(1), 42–71. https://doi.org/10.1002/bse.3117
Zahra, S. A., & George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. *The Academy of Management Review* (Vol. 27, Issue 2). https://www.jstor.org/stable/4134351

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF SERVICE MANAGEMENT AND LOGISTICS
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden
www.chalmers.se

CHALMERS
UNIVERSITY OF TECHNOLOGY