Sustainability Innovation in the Swedish Real Estate and Construction Sector

Conditions for the Commercialization and Implementation of Innovations from Startups

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MSc Thesis (30 ECTS credits)
Science for Sustainable development

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1 Abstract

Sweden has the goal to become net climate neutral by 2045. Due to its considerable environmental impact, the real estate and construction sector plays a crucial role in achieving this target. Given the time constraints and progress required, disruptive innovations to increase sustainability are needed. Startups are considered a promising source of such innovations because they are often less locked in by previous paths and existing structures. This study explores the conditions for the commercialization and implementation of sustainability innovations from startups in the Swedish real estate and construction sector. More specifically, it explores (1) the need for sustainability innovation perceived by actors around a startup and (2) the perceptions of the conditions for commercialization and implementation for such innovation. In-depth interviews were conducted with a startup as well as different groups of public and private organizations around it. Main findings are an increasing awareness of sustainability among all actors, albeit to a varying degree and based on different drivers. Main entry barriers for startups into the sector are the imbalanced distribution of risk and reward among actors in construction projects, skewing the responsibility for pushing sustainability innovation towards real estate firms and individuals and assigning sustainability champions a crucial role in connecting innovations and actors. Furthermore, the innovation system is not fit for the sector and the business case for sustainability is not sufficiently established yet. More long-term and system thinking is required in project set-up and policy making.

Keywords: construction, real estate, startup, sustainability innovation, Sweden

2 List of abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>EU</td>
<td>European Union</td>
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<td>GHG</td>
<td>Greenhouse gas</td>
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<td>SDGs</td>
<td>Sustainable Development Goals</td>
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<td>SES</td>
<td>Social-ecological system</td>
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3 Introduction

Latest since the Brundtland Report in 1987, a widely agreed-upon understanding of the concept of sustainable development as a “[…]development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987) has been established. A fundamental aspect of facilitating a sustainable development is addressing climate change. By regarding social-ecological systems (SES) as complex, intertwined structures which only function within certain critical thresholds (planetary boundaries), resilience thinking (Olsson, Folke and Hahn, 2004) and the concept of planetary boundaries (Rockström et al., 2009) illustrate why humanity’s current trajectory is unsustainable and therefore must be transformed to follow a sustainable development if we want to avoid irreversibly moving our SES out of its current functionality and secure our survival.
Folke et al. (2010) and Westley et al. (2011) point to the crucial need for innovation and novelty if the current path of our SES is to be transformed into a sustainable one. The special report on global warming released by the Intergovernmental Panel on Climate Change (2018) predicts that the critical level of 1.5°C warming could already be reached and subsequently be exceeded by 2030 in a business as usual scenario. This illustrates the time pressure humanity is under to change our trajectory fast, implying that the novelty and innovation we require to do so need to be drastically different from the status quo, which points to the possibilities offered by disruptive innovations. Small companies and working groups, such as startups, have been identified as an important source for such innovation because in contrast to established organizations, they are not or considerably less locked into complex organizational structures and thus path dependencies (Christensen and Bower, 1996; Hannan and Freeman, 1984; Hill and Rothaermel, 2003). Startups in this study are defined as companies which (1) are younger than ten years, (2) have an innovative business model, service and/or product and (3) aim to scale in terms of employees and/or market presence (EU Startup Monitor, 2019).

Facilitating a sustainable development has become the core of a number of international strategies, with the most comprehensive one being the Sustainable Development Goals (SDGs) of the United Nations (2015). In the face of increasing knowledge about and visible impacts of climate change, targets addressing more specifically the climate have been set. Examples include the Paris Agreement (UNFCCC, 2015) or the European Commission’s vision to make the European Union (EU) climate neutral by 2050 (European Commission, 2018). Sweden has set itself the goal to become net climate neutral already by 2045 (The Swedish Government, 2017). Despite being a leader in climate ambitions within the EU, Sweden is currently not on track to reach the target with a greenhouse gas (GHG) emission reduction rate of less than 1% annually in contrast to the required 5% to 8% per annum (Swedish Climate Policy Council, 2019).

Several sectors have been identified to play a key role in achieving the target, among them real estate and construction (Mistra Carbon Exit, 2018). Its domestic GHG emissions accounted for 21% of Sweden’s total GHG emissions according to Boverket (2019), the Swedish National Board of Housing, Building and Planning. The sector further represented 37% of the total energy consumed in Sweden in the same year. This highlights the importance of finding solutions to decrease the sector’s environmental footprint, especially considering that buildings are in most cases used for several decades, making today’s choices of building practices and materials a deciding factor for long-term environmental impacts.

In 2018, a sector-wide roadmap has been adopted in Sweden, setting milestones along the path towards climate neutrality of value chains in the construction and civil engineering sector. It predicts that the sector’s carbon emissions could be cut in half using presently available technologies, but in order to reach the 2045 goal, a shift in technology and the rapid commercialization of innovations are required (Fossilfritt Sverige, 2018). This draws back to the crucial role of disruptive innovation and startups as a promising source.

Studies about (sustainability) innovation in the Swedish real estate and construction sector have mostly focused on large construction companies and partially on small contractors so far. Little attention has been paid to startups in the sector and the conditions they face regarding the commercialization and implementation of their sustainability innovation into projects. This study will address this gap by examining the case of a relevant startup and its surrounding actors, which act as a breeding ground and deciding factor over the success of an innovation’s commercialization and implementation in projects.
Aim

The aim of this study is to explore the conditions for sustainability innovations from startups in the Swedish real estate and construction sector in the light of Sweden’s target to achieve climate neutrality by 2045. More specifically, this study will focus on (1) the need for sustainability innovation perceived by actors around a startup and (2) the perceptions of the conditions for commercialization and implementation for such innovation.

In order to fulfill the aim, the following research questions will be asked:

Research questions

(1) Perceived need for sustainability innovation

1. How do actors in the construction and real estate sector along a startup’s value chain perceive their role in achieving Sweden’s goal of climate neutrality by 2045?

2. How do these actors describe their drivers for working towards sustainability?

(2) Actors’ perceptions regarding the conditions for sustainability innovation in the sector

3. What characterizes the perceptions of and ways in which different actors work with sustainability knowledge and innovation, especially from startups? Can patterns be found among the perceptions and approaches of the actors?

4. Which challenges are perceived by a startup and its surrounding actors that prevent the effective spread of innovations contributing to a sustainable development of the Swedish construction and real estate sector?

The nanotechnology startup MIMSI Materials AB from Linköping, Sweden, will be used in this study as an example of a startup with an innovation relevant to the sustainable development of the Swedish real estate and construction sector. They have developed a material innovation to significantly increase the energy efficiency of windows while at the same time not impacting the transparency of the glass. For a further motivation of this case selection, refer to Case Selection.
4 Background

The background section will follow the same line of argumentation as the introduction. The concept of resilience thinking will serve as the fundamental theoretical framework for the whole analysis. In order to comprehensively scrutinize the case at hand, resilience thinking will be connected to the concepts of innovation, sustainable development and organizational sustainability drivers and implementation. This extended analytical framework will be supplemented by background information about the Swedish real estate and construction sector, providing case-relevant knowledge to facilitate a better understanding of the results.

Resilience Thinking

The concept of resilience, originating from the description of a material’s ability to rebound to its original state after being exposed to adversity, has found increasing application to social-ecological systems in recent years (Walker et al., 2004; Folke et al., 2010; Holling, 1973). In the context of SES, the concept is applied to the entire system, acknowledging the closely interconnected nature of its individual parts, and has been defined as “the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks” (Walker et al., 2004, p.4). Based on the notion of resilience, the idea of planetary boundaries illustrates the “safe operating space” (Rockström et al., 2009), i.e. the critical thresholds for several indicators below which the Earth System will be able to maintain its functionality (Rockström et al., 2009; Steffen et al., 2015). The operational space within the critical boundaries described by Rockström et al. (2009) is closely related to what Walker et al. (2004) refer to as basins of attraction, describing a zone within which the system state, i.e. the combination of the values of the variables making up the system, tends to remain. A system can move into a different basin of attraction when the critical thresholds of one basin are exceeded. Applied to the SES of our planet, some basins are desirable to be in, others would mean that life on earth in its current form would no longer be possible (Walker et al., 2004; Beisner, Haydon and Cuddington, 2003). Both Walker et al. (2004) and Folke et al. (2010) furthermore point out the ideas of adaptability and transformability as important factors in the application of resilience thinking to SES. Adaptability describes the ability of system actors to influence the resilience, i.e. to manage the system, and transformability terms the “capacity to create a fundamentally new system when ecological, economic, or social (including political) conditions make the existing system untenable” (Walker et al., 2004, p.3).

The only basin of attraction so far that has for sure shown the necessary conditions for human life on earth is the one of the Holocene (Rockström et al., 2009). Steffen, Crutzen and McNeill (2007) argue that continuing the current patterns of humanity could tip our SES into a different, not desirable basin. In order to avoid passing a critical threshold which would push our climate out of the state is has been in for the time of the Holocene, innovation and novelty are needed to transform current patterns of the SES that will not be tenable in the long-term (Folke et al., 2010; Westley et al., 2011).

The concept of innovation

Defining innovation

When trying to define the concept of innovation, it becomes obvious that there is not a single agreed-upon way of doing so, but varying approaches depending on the scientific discipline and also on the industry the concept is applied to. As Johannessen, Olsen and Lumpkin (2001) note, it can be said though that the vast majority of definitions of innovation have the notion of
newness as a common denominator. Beyond the characteristic of newness, three dimensions can be identified to describe innovations: their scope, their degree of newness and the sphere they address. The scope is concerned with whether an innovation happens at firm level or at a systemic level, meaning whether its main benefits are limited to the innovating firm and their stakeholders or if they extend to the whole SES (Westley et al., 2011). Another dimension of innovation is the degree of novelty, ranging from incremental to disruptive. An incremental innovation slightly modifies something existing while a disruptive innovation introduces something completely new or combines things in unseen ways that differ significantly from the status quo (Johannessen, Olsen and Lumpkin, 2001; Christensen and Bower, 1996). The third dimension is about the sphere addressed by the innovation, i.e. whether it is a social or technological innovation. According to Nguyen-Thi and Mothe (2010), innovations usually have a social as well as a technological component, which can play a more or less important role depending on the innovation. Although some scholars, e.g. Schmidt and Rammer (2007), argue that there are purely technological innovations, criticism has been voiced towards this perception based on the argument that every innovation must involve a social component at least for its spread in a social system (Hoppe and de Vries, 2018). The existence of purely social innovations on the other hand has been accepted as a valid idea by a number of scholars (e.g. Gallouj and Savona, 2009).

**Sustainability innovation**

Since the middle of the previous century, the concept of innovation has evolved into a central way for societies to raise their standard of living (Schumpeter, 1992) and for firms to create and maintain competitive advantage and thus secure their economic survival (see e.g. Drucker, 1985; Freeman and Soete, 1997). In recent years, the concept of sustainability innovation – also interchangeably referred to as environmental, green or eco innovation – has gained growing presence in academic literature. Just as with the larger term of innovation, there is also no established definition of sustainability innovation, but all definitions emphasize the environmental focus of the innovation which leads to fewer negative impacts on the environment and a more efficient use of resources (Hojnik and Ruzzier, 2016). Sustainability innovation builds on acknowledging the inherently intertwined and interdependent nature of SES on a global scale (Steffen, Crutzen and McNeill, 2007), a crucial foundation to resilience thinking. Ongoing today, social and ecological systems have frequently been separated conceptually and institutionally (Folke et al., 2011), leading to a dissonance between the organization of the biosphere and the “technosphere”, which is often considered the innovative engine driving our modern economy (Commoner, 1993). One major difference is the linear nature attributed to technological and economic development in contrast to the cyclical complexion of processes in nature (Commoner, 1993). While Western economic models are based on the assumption of unlimited growth and humanity’s technological progress has reached an exponential development (Rockström et al., 2009), nature is characterized by alternating periods of creation and destruction, where one draws its resources from the other. The equilibrium of the biosphere is thus a dynamic one between matter and energy, while the maxim of the “technosphere” is to strive for maximizing profit by externalizing social and environmental costs (Commoner, 1993). Linked to the linear and cyclical nature of the two systems is the understanding that all parts of the biosphere are interlinked and evolve in relation to one another whereas in the “technosphere”, it is believed that individual variables of the system can be changed without an impact on the larger system (Commoner, 1993).
Innovation dynamics in society

A better understanding of the dynamics of innovations within societies can be facilitated by looking at them from three different levels: a macro, meso and micro level (Westley et al., 2011). The macro level is embodied by different institutions such as the economy, the culture and the governance and describes the rules by which these institutions govern the behavior of different organizations within the society, ranging from the government to a small firm (Giddens, 1976). The meso or problem level is where these organizations act. The micro level looks at individuals or small groups and can according to Christensen and Bower (1996) be regarded as the origin of invention and a breeding ground for disruptive innovation. Through the lens of resilience thinking and the resulting transformation our SES requires, it can thus be seen that the interplay of these levels is critical: In order to impact the entire system at a significant scale, a relevant innovation needs to make its way from the micro to the macro level, meaning that it needs to translate from the thoughts of an individual or small group into the operations of an organization and from there ideally give impulses of transformation to the macro level, e.g. by influencing the present paradigms of the economy or governance into a direction that favors a more sustainable trajectory.

On its journey from ideation to implementation, innovations face a stage commonly referred to as the Valley of Death, which can be summarized as the place “where good lab discoveries go to die because they lack the funding necessary to become a commercial product” (Heller and Peterson, 2019, p.1). Auerswald and Branscomb (2003) elaborate on the role of the industry in determining the extent of the Valley of Death as well as the need for government intervention to bridge it, as will be explained later on. This illustrates again the importance of an orchestrated interplay between the different levels of society to facilitate innovation.

The role of innovation for sustainable development

The paradox of innovation

In the context of sustainable development, innovation presents itself as a double-edged sword. On the one hand, the high standard of living in Western countries resulting from continuous technological and social progress through innovation is the underlying reason for humanity’s current, unsustainable path, but at the same time, innovation offers an opportunity to continue our journey into new, more sustainable directions (Westley et al., 2011). Over the course of the past three centuries, innovation has changed from being demand-driven to being supply driven, i.e. instead of addressing needs, many innovations try to create desires with the purpose of generating sales and spurring the growth that many economies rely on. Especially since the 1950s, our demographic and economic development have made economic success and shareholder value the heart of entrepreneurship and replaced its previous core aim of providing a steady supply of needed goods and services as well as employment. This has led to business practices striving for shareholder value maximization by externalizing social and environmental costs (Westley et al., 2011). Steffen et al. (2011) emphasize furthermore the acceleration of the pace of innovation and augmentation of material wealth since the Industrial Revolution which have led to imprints of humans in the biosphere to a degree where shortages in critical resources, the deterioration of ecosystem services and the declining capability of the planet to absorb our waste have developed into growing challenges. The exponential character of the problem highlights the importance of fast reactions addressing the roots of the issue by transforming the current SES before it irreversibly moves to an undesirable basin of attraction.

Challenges to innovation for sustainable development

One main challenge of a system transformation are the limits to human ingenuity, meaning that the links in our SES are of such complex nature that the growth pattern of human environmental
knowledge in comparisons to the unknown outcomes of how our decisions affect the environment can at best be described as a geometric growth of the knowledge versus an exponential growth of the unknowns (Westley et al.; 2011; van der Leeuw, 2010). This issue is reinforced in the arena of systematic innovations, which distinguish themselves importantly from innovation at the firm level by their much greater complexity that decouples them from mechanisms of the free market and makes the intervention of governmental and intergovernmental institutions necessary (Westley and Antadze, 2010; Hillman et al., 2011).

The importance of intervention from forces outside the market is emphasized when considering the innovative capacity that the private sector inhibits in free market economies (Westley et al., 2011). Porter and Kramer (2011) argue that private actors would move into the domain of environmental and social problems in order to tap into new business opportunities, but this idea is challenged by e.g. Westley et al. (2011) based on the reasoning that firms’ maxims are profit and shareholder value maximization and since social and environmental negative externalities of doing business do not have a monetary cost yet, the business case for the most sustainable solutions is not established so far. This means though that the innovative potential of private actors to transform our current trajectory into a sustainable one, will not be released fully – and mostly also not at the required speed considering the urgency of climate change – until the incentive system for firms shifts away from purely economic variables (Loorbach, 2010).

A further challenge to a sufficiently fast transformation of our system resides in path dependencies of technological and social progress. As Arthur (2009) indicates, new technologies are always based on advancements or new combinations of previous knowledge and technologies, which is why when a system is hit by an unprecedented form of crisis, such as climate change, our innovative response is hindered by the technological path we are locked into and our supply-driven culture of innovation (Westley et al., 2011). The technological path dependency is composed of social, legal and economic factors (Walker et al., 2009). This particularly affects established firms who are not only locked in by the common knowledge of society, but furthermore by the previous products, processes and culture of their own organization (Hill and Rothaermel, 2003; Hannan and Freeman, 1984).

**Startups and institutional entrepreneurs**

One increasingly popular attempt of overcoming the innovation hurdle posed by organizational path dependencies and habits is the cooperation with startups (Bauer, Obwegeser and Avdagic, 2016). The authors point out the symbiosis of corporations working with startups through structured accelerator programs because while the startup supplies a disruptive innovation, agile structures and typically high personal drive of employees, the incumbent firm can provide capital, customers and expertise (Bauer, Obwegeser and Avdagic, 2016). Despite these apparent synergies, Kohler (2016) brings forward possible challenges in the relationship between an established organization with a larger degree of formalization and a young, small company where the individual still has larger freedom of personal judgement in decisions.

Although the trend of corporations engaging with early stage startups through accelerator programs is growing, this concept still only accounts for a small share of corporations’ innovation activities (Bauer, Obwegeser and Avdagic, 2016). Westley et al. (2011) elaborate on the pivotal role of *institutional entrepreneurs* for the acceleration of sustainable transformation through innovation in private as well as public entities. Institutional entrepreneurs act as middlemen between promising innovations at a micro scale and the meso scale of existing organizations, “question[ing] the institutional context, fram[ing] it for those working at more micro scales, identif[ing] those inventions with potential to tip systems and sell[ing] these to institutional decision makers when the opportunity arises” (Westley et al.,
2011, p.768). They can bridge gaps between incumbent organizations and innovations from individuals or small groups by providing leadership, building trust, making sense and developing a vision (Olsson, Folke and Hahn, 2004; Gutiérrez, Hilborn and Defeo, 2011). They tend to be well-connected across society and can bring together individuals and innovations that might otherwise not encounter each other but have relevant synergies (Bebbington, 1997; Ernstson et al., 2010).

**Organizational sustainability**

**Drivers**

Given the innovative capacity of the private sector and the need of intervention from public actors, which this study considers as well, the following section will provide an insight into drivers for organizational sustainability as well as the stages of implementing the latter one. Several authors highlight that until this day, the majority of studies about sustainability drivers has been conducted in the private sector, while less light has been shed on public institutions (Lozano and von Haartman, 2018; Gelderman, Semeijn and Vluggen, 2017).

Most commonly, drivers for sustainability are divided into internal and external ones and the majority of previous studies has concentrated on either one of them in isolation (Lozano, 2015). Lozano and von Haartman (2018) have added a connecting sphere and regard all drivers simultaneously and in an interlinked manner, allowing for a more holistic understanding. External drivers, which concern the relationships with stakeholders outside the organization, often tend to generate more reactive measures, while internal drivers, concerning the organization’s processes and economy, commonly have a more proactive and intrinsically motivated nature (DeSimone and Popoff, 2000). Lozano (2015), studying private organizations, notes in his study where executives were interviewed about sustainability drivers, that they mostly named external ones and only few internal ones, from which he concludes that external stimuli are either identified more easily or that the mentality concerning sustainability tends to be rather reactive than proactive. The stronger influence of external drivers is supported by the findings of Walker, Di Sisto and McBain (2008), who studied sustainability drivers and barriers in public organizations.

Scrutinizing public as well as private organizations at the same time, Lozano and von Haartman (2018) find “proactive leadership” (p.516) to be the most commonly identified internal driver, while “increased levels of social awareness of sustainability” (p.516) ranked as the most widely named external driver and “reputation” (p.516) was the driver within the connecting sphere that respondents pinpointed in the highest number of instances. Relating back to the concept of institutional entrepreneurs, Lozano (2015) and Lozano and von Haartman (2018) furthermore present sustainability champions as an internal driving force for organizational sustainability. Going beyond sustainability at organizational level, institutional entrepreneurs play a critical role in connection the different levels of society, which has been identified as crucial to enabling innovation at a systemic level and thus transformation. Walker, Di Sisto and McBain (2008) moreover add regulations as an important external driver for public organizations, but highlight at the same time that regulations are often also a hindrance to sustainability because they limit organizations in their choice of solutions to problems and tend to be lagging behind technology.

**Stages of implementation**

The implementation of sustainability in organizations typically passes through different stages. Landrum (2018) identifies in a comprehensive literature review that (1) there is an abundance of models analyzing these stages at an organizational level while macro-scale models for the entire SES are still sparse, (2) the models have varying numbers of stages as well as different starting points and (3) the models represent different interpretations of sustainability grounded
in different worldviews. Based on Pearce's (1993) work, Landrum (2018) adopts a sustainability spectrum ranging from very weak to very strong sustainability. Weak and strong sustainability distinguish themselves from each other by their underlying assumptions: While weak sustainability presents humans as the rulers of nature, strong sustainability regards them as a part of nature (Shrivastava, 1995). In other words, the worldviews could be described as technocentric versus ecocentric respectively (Landrum, 2018). The technocentric side of the spectrum considers natural capital to be replaceable by human-made capital (Hartwick, 1978, 1977; Solow, 1974, 1993), whereas the ecocentric side of the spectrum acknowledges that economic activity can only take place within environmental limits (Hediger, 1999). It can thus be said that the ecocentric worldview, acknowledging that individual variable in an SES cannot operate in isolation and only within the boundaries of the system, lays the organizational foundation for sustainability innovation.

Landrum (2018) emphasizes though that the reduction of unsustainability does not equal the creation of sustainability and lifts the argument that everything done by businesses – at least until a few years ago – could be classified as a reduction of unsustainability. This plays into Porter and Kramer’s (2006) as well as Lozano’s (2015) argumentation that sustainability needs to be implemented into all areas of business strategy and operations and thus move to the core of a business instead of being an added activity if it is to enfold its full potential, but this poses still a major challenge to many organizations. The journey of sustainability, from being an activity on the side, which is not necessarily related to the operations of a business, to becoming its core, equals a shift from (very) weak to (very) strong sustainability and is argued to require continuous improvement and adjustment of internal structures, activities and management as well as the way of engaging with stakeholders, inclusive of the environment (Lozano, 2013). Due to the increasing social awareness about environmental issues, incorporating sustainability into business can have beneficial effects on a firm’s image, but Delmas and Burbano (2012) call to attention that the same awareness can also lead to harm for a firm in case of false claims about working towards sustainability.

The Swedish construction and real estate sector

The sector’s environmental impact

As in other European countries, the construction and real estate sector plays a crucial role in Sweden reaching its national climate targets but also contributing to international sustainable development commitments: The sector accounted, inter alia, for a considerable share of Sweden’s domestic GHG emissions (21%), Sweden’s energy use (37%) and Sweden’s generated waste (31%) in 2016 (Boverket, 2019). These strong impacts on the environment originate e.g. from the fossil fuel intensive production processes (IVA and Sveriges Byggindustrier, 2014), for which a sector wide action plan aiming for a climate neutral value chain has been set up (Fossilfritt Sverige, 2018). Besides the production, it is the operation of buildings which contributes to the sector’s large environmental impact, in particular through heating and cooling (Fossilfritt Sverige, 2018).

Sector structure and implications for innovation

The structure of the Swedish real estate and construction sector is characterized by fragmentation of actors and resources as well as long value chains. Buildings are typically commissioned by either a public or private real estate firm, designed by architects and technical planners and built by construction firms. In between these actors, consultants with different specializations can be found and more upstream the value chain, the manufacturers of building parts are located (Segerstedt and Olofsson, 2010). The cooperation in the sector mainly happens on a project basis, which has several implications for often observed behavior patterns of its
actors. One of them is a relatively high level of risk aversion caused by the rather loose ties between actors, which is reinforced by the imbalanced distribution of the cost and reward for taking risks, such as in the case of innovation implementation (Dubois and Gadde, 2002; Bygballe and Ingemansson, 2014). This creates an exceptionally long Valley of Death for innovation with a higher degree of novelty. Furthermore, the fragmentation impacts the dynamics of learning and innovation as many innovations and learnings arise in the context of a specific project, but there is no centralized base for harvesting these. Instead, when the actors part after the termination of the project, the innovations and learnings tend to not be utilized beyond their specific application in the project (Manley, McFallan and Kajewski, 2009; Brady and Davies, 2004). This, combined with the long duration of projects, considerably impedes the speed of innovation in the real estate and construction sector. The risk adversity additionally favors incremental over disruptive innovation, lowering the overall speed of progress (Bygballe and Ingemansson, 2014).

Looking more specifically at sustainability innovation in the sector, the phenomenon of “living labs” has gained increasing application in recent years (Bergvall-Kåreborn et al., 2009; Eriksson et al., 2006). Living labs are experimental living set-ups in which “e.g. researchers, firms, users, public partners and stakeholders of emerging technology collaborate in innovation processes in real-world settings” (Bergvall-Kåreborn et al., 2009, p.2). Such experimental spaces allow for different stakeholders to contribute from an early stage of product/service development while minimizing risks thanks to the dedicated environment (Eriksson et al., 2006).

**Local specificities**

A distinct feature of real estate and construction is its local character. In contrast to other sectors, it is considerably less influenced by global trends, but rather is shaped through local and national circumstances, such as the geography, climate, natural resources, national and local regulations and subsidies as well as the culture of a country (Segerstedt and Olofsson, 2010). Several scholars, e.g. Bygballe and Ingemansson (2014), identify regulations as a particularly strong driver for sustainability and innovation in the construction and real estate sector in Sweden, where a strong position of the government can be observed in comparison to other countries. 39% of all public procurement tenders in Sweden in 2017 were called for within the construction and real estate sector under the *Lagen om Offentlig Upphandling*, the Swedish law of public procurement (Upphandlingsmyndigheten and Konkurrensverket, 2018). Connected to sustainability, Arvidsson and Stage (2012) analyze the increasing trend of green public procurement in Sweden, but criticize that it possibly limits sustainability and innovation in the long-term because of the reliance on meticulous technological specifications that can shift the focus too much on short-term incentives. This complements Walker, Di Sisto and McBain (2008) who point out the dual nature of regulations as a driver and hindrance to sustainability and innovation at the same time.
5 Materials and methods

Methodological approach
A multi-methodological approach was employed in this study. According to the classification by Bryman and Bell (2015), the design of the research was a case study and the methods used were semi-structured interviews as main method and a complementary document review in preparation and postprocessing of interviews. Method triangulation allows for enriching the collected data and thus strengthening the validity of the study results (Jonsen and Jehn, 2009). The research strategy of this study is based on qualitative data which can be useful for gaining deep insight into issues of interest through the viewpoints of relevant experts. Even though the data does not necessarily print a complete and certainly not an objective picture, it can be argued that carefully chosen experts as interviewees combine knowledge and experience in a way that promises to provide thematically and timely relevant findings (Bryman and Bell, 2015).

Case Study as a Research Design
In order to find answers to the above-stated research questions, it was chosen to study the case of one single startup and its surrounding actors in depth rather than studying the cases of many startups. This choice is mainly based on two factors.

Firstly, it was desired to gain an in-depth understanding of the present phenomenon within the time boundaries of the thesis, making it favorable to study one instrumental case, which can contribute to a better understanding of a broader issue. In contrast to an intrinsic case, where the researcher is mostly interested in understanding the peculiarities of a specific case, the case itself in an instrumental case study is secondary to the anticipated learning opportunities it provides beyond the mere understanding of itself (Stake, 1995). Lee, Collier and Cullen (2007) emphasize though that the primary strength of case studies is not to be generalizable, but rather that the focus on understanding the complexity of one case in detail can facilitate learning in a wider context.

Secondly, a case study is a preferable choice when the study looks at the “how” and “why” of a phenomenon that the researcher cannot or very limitedly exert control over and thus not examine through an experiment for instance (Yin, 2014).

Case Selection
The Swedish real estate and construction sector
As argued above, the real estate and construction sector plays an important role in addressing climate change. Compared to all other EU countries, Sweden has set the most ambitious climate targets and ranks furthermore first in following through on them (Climate Action Network, 2018). These targets’ fulfillment requires substantial contributions from the building sector. Besides its ambition to perform above the EU-wide requirements in climate matters, the country has also been characterized for years by high overall innovativeness (Cornell University, INSEAD and WIPO, 2019). Considering Sweden’s relative progressiveness in both areas, it could serve as a role model for other countries or at least provide learnings for other countries that are still in an earlier stage of their sustainable development journey.

MIMSI Materials AB and surrounding actors
According to Stake's (1995) widely-cited work about case studies, the primary criterion when selecting a case should be the opportunity for the greatest learning. Within the Swedish real
estate and construction sector, the case of MIMSI and its surrounding actors was chosen as an *instrumental* case. Through the multitude of considered perspectives, this case study promises to provide comprehensive insights into the issues in question.

MIMSI can be considered a case with large learning opportunities beyond itself for several reasons. Firstly, their technology addresses the energy efficiency of glass. With energy consumption being a major sustainability challenge of buildings (Boverket, 2019) and glass components being a critical element for the design of healthy living and working spaces (World Green Building Council, 2014), the relevance of their innovation is easily understandable and provides an example for discussions to both actors that are in some form in contact with the startup already, but also actors that have not previously heard of MIMSI.

Secondly, MIMSI’s technology cannot be found on the market just yet and limited information was available on their website at the time of the interviews, allowing for the discussions to really be about the concept of an innovation from a startup without being influenced by factors such as e.g. their branding or previous projects that the companies might have undertaken before. These two factors combined encourage interviewees to talk more generally about their perception of working with innovations from external parties – especially startups – rather than focusing on and judging the concrete relationship with MIMSI. This leaves room for discussions beyond the specific case at hand and thus offers an opportunity of learning about more general market dynamics.

A third argument for choosing MIMSI was their interest in and openness for the study, which Stake (1995) points out as a factor considerably aiding learning and supporting the feasibility of a study, being almost always bound to certain timely and financial limits.

**Interviews**

**Mapping out relevant actors around the startup**

The first step in identifying relevant potential interviewees was a meeting with MIMSI at the very beginning of the thesis period, in which the actors surrounding the startup were mapped out based on their value chain and completed with further relevant organizations, such as governmental entities. This provided on the one hand a better understanding of the structure of the industry, complementing previous knowledge gained from scientific literature as well as specialized journalistic work (such as specialized news articles). On the other hand, it facilitated a discussion about the company representatives’ and student’s contact network, identifying concrete persons within organizations that could either be interviewed or help to set up an interview with a colleague working with the topics in question. After the first meeting, the initial value chain drawn together with MIMSI was taken and identified actors were grouped into categories as depicted in *Fig.1*. Further organizations that were deemed relevant were added when encountered over the course of the subsequent research.
The selection of interviewees

Due to this study’s focus on Sweden and the fact that the few coated glass vendors dominating the European market and their suppliers act globally (European Commission, 2008), it was chosen to put emphasis on actors further down the value stream which can be more specifically placed into the context of the Swedish real estate and construction sector. Relevant organizations within the actor groups were identified on the one hand through the mapping with MIMSI and on the other hand through desk research about who the market leaders are in the respective field. If either MISHI or I had a personal contact to one of the leading organizations, these were reached out to first due to higher expected chances of arranging an interview. In case this approach did not lead to an interview or there were no personal connections available within an actor group, organizations were chosen and contacted based on the results of the student’s desk research about the field.

A special case in terms of selection criteria was posed by the real estate companies. It was desired from the beginning to talk to actors in different segments of the real estate sector, namely housing, public buildings, and commercial real estate. Ideally, interviews with private as well as public actors would have been conducted, but unfortunately, no attempt of contacting private real estate organizations yielded an interview. It is furthermore worth noting that all three real estate companies are located in the same city and thus are striving for the same overarching goals set by the municipality. This provides on one hand the opportunity to put more emphasis on the differences arising from their differing organizational purposes rather than the larger political decisions, but at the same time also limits the perspective to one municipality. Like private real estate firms, also attempts of setting up interviews with architects yielded no success. See interviewee sample limitations.

The interviewee furthest up the value chain was the insulated glass unit manufacturer VELUX Group, the world leader for roof window solutions (VELUX Group, 2017). This was the only actor with headquarters outside of Sweden, namely in Denmark. The reason VELUX was nevertheless chosen for an interview is their leading position in the Swedish roof window market where they are represented through their subsidiary VELUX Svenska AB (VELUX...
Group, 2019). Their research and development are centralized in Denmark on group level but done in cooperation with the different markets they are represented in (VELUX Group, 2019).

In some organizations, several people were deemed to be relevant or necessary to fully cover all topics of this study, which is why more than one person was interviewed in three cases. This was either done through multiple individual interviews or a single meeting with all participants. Every respondent had their area of expertise, which justified the necessity of their participation in the study, and even though participants reacted to each other’s answers and sometimes complemented them with their own viewpoints, a clear main respondent could be identified for each question. According to Gibbs (1997), this methodological approach can be assigned to the category of group interviewing, which “involves interviewing a number of people at the same time, the emphasis being on questions and responses between the researcher and participants” (Gibbs, 1997, p.1). Group interviewing is to be distinguished from focus group studies, which concentrate on the interaction between the participants while appointing a more passive role to the researcher. This distinction qualifies the conducted meetings as group interviews rather than focus groups, which is important to consider due to the higher similarity between group and individual interviews rather than individual interviews and focus group studies and thus higher methodological consistency and comparability of results (Gibbs, 1997). One interviewee represented two organizations, namely ÅF Pöyry AB, which he recently joined, and Vinnova, where he was in a position relevant to this study for several years just before joining ÅF. The interviews were conducted at separate times and locations as to support the distinction of professional functions represented.
Table 1: Interviewees according to actor groups

<table>
<thead>
<tr>
<th>Real Estate Organizations</th>
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<tbody>
<tr>
<td>AB Stångåstaden</td>
<td>Malin Ribbenhed</td>
<td>Head of Quality and Sustainability</td>
</tr>
<tr>
<td></td>
<td>Robert Bäckström</td>
<td>Project Leader New Construction</td>
</tr>
<tr>
<td></td>
<td>Lina Hallberg</td>
<td>Head of Technology and Energy</td>
</tr>
<tr>
<td>Lejonfastigheter AB</td>
<td>Maria Widfeldt</td>
<td>Head of Sustainability, Procurement and Communication</td>
</tr>
<tr>
<td>Sankt Kors Fastighets AB</td>
<td>Anna-Maria Jakobsson</td>
<td>Vice CEO</td>
</tr>
</tbody>
</table>

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<tr>
<th>Civil Engineering and Construction Companies</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NCC Group</td>
<td>Christina Lindbäck</td>
<td>Head of Sustainability</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Civil Engineering and Management Consultancies</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AF Pöyry AB</td>
<td>Tony Friede</td>
<td>Innovation and Growth Hacker</td>
</tr>
<tr>
<td></td>
<td>Sara Lindstrand</td>
<td>Senior Manager Sustainability</td>
</tr>
<tr>
<td>WSP Sverige AB</td>
<td>Sofia Nyholm</td>
<td>Head of Corporate Sustainability</td>
</tr>
<tr>
<td></td>
<td>Charlotte Hauksson</td>
<td>Project Manager and Senior Advisor for Sustainable Development</td>
</tr>
<tr>
<td>Others</td>
<td>Consultant 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulated Glass Manufacturers</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VELUX Group</td>
<td>Martin Pors Jepsen</td>
<td>VP VELUX Innovation Center</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agencies of the Swedish Government</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The Swedish Energy Agency</td>
<td>Sasan Shaba</td>
<td>Portfolio Manager and Business Developer</td>
</tr>
<tr>
<td>Vinnova</td>
<td>Tony Friede</td>
<td>Program Manager, Information and Communication Technology</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Startup</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MIMSI Materials AB</td>
<td>Sankara Pillay</td>
<td>CEO</td>
</tr>
<tr>
<td></td>
<td>Viktor Elofsson</td>
<td>CTO</td>
</tr>
</tbody>
</table>

**Interview approach**

The data collection for this study was based on qualitative, semi-structured interviews. For MIMSI Materials AB, additional material was collected through observations in more informal meetings over the course of the study. Since understanding the experiences and perspectives of the startup were of particular interest to this study, this approach was deemed appropriate to gain an as-deep-as-possible insight within the time being and furthermore also follow and understand the developments of the company, which were not extensively reported through other channels.

Twelve out of the 16 interviews were conducted in person in the interviewees’ offices while the remaining four interviews were held over the phone. Meetings with MIMSI have taken
place in their office as well as in the neighboring co-working space. The choice of offices as an interview location was driven by the goal to make the respondents feel comfortable and furthermore by wanting to learn about their perspectives primarily from their professional viewpoint, which has been pointed out to occur more naturally in an environment associated with the organization (Elwood and Martin, 2000). Although face-to-face interviews have been the preferred choice for this study since they allow the researcher to establish a personal connection more easily, phone interviews were employed due to time restrictions in the project. Sturges and Hanrahan (2004) have found no significant differences in the data quality between telephone and face-to-face interviews as long as the data collection does not draw upon non-verbal expressions. Since non-verbal information was not considered in the analysis, telephone interviews were deemed acceptable.

The interviews were conducted along the lines of an interview guide in order to cover all areas relevant to answering the research questions. The questions were kept relatively open with the purpose of not limiting the interviewees in their answers and thus discover and follow up on potentially arising, interesting side tracks (Brinkmann and Kvale, 2015). The questions were adapted to the organizational form of the actors (private or governmental) and the resulting role. The formal interview with the startup was conducted as a complement to the data collected informally and thus the interview guide only contains the questions filling information gaps. Depending on the dynamic of the interview, the order of questions was sometimes rearranged with the purpose of keeping up the flow of the conversation. Furthermore, attention has been paid to formulating the questions in a concise manner and with words that encourage the respondents to talk freely and extensively without feeling interrogated (Brinkmann and Kvale, 2015). The interview guides can be found in Appendices 1-3.

All interviews were audio-recorded with the consent of the respondents allowing to focus on the conversation instead of taking extensive notes. Such were taken though to complement the recordings, especially in instances where the conversation involved a visual component, such as a PowerPoint presentation.

As a first step in the analysis, all interviews were transcribed from spoken to written language. It is important to consider the interpretative process that is taking place here and understand its impact on the validity and reliability of the material (Brinkmann and Kvale, 2015). Since the purpose of the interviews was to gain insight into what is expressed rather than how, a less verbatim transcription approach without filler words and grammatical errors was chosen. This contributed positively to the readability of the transcripts and thus the further analysis. Although the linguistic component was not the focus of the interviews, it is still important to note non-verbal components such as laughter or other expressions that indicate jokes, irony or sarcasm because these change the meaning of what was said (Brinkmann and Kvale, 2015). Such expressions were thus marked as well in the transcriptions.

**Written documents as complements**

Complementary to the interviews, the websites and latest strategy as well as sustainability reports of organizations were consulted. All of these documents were publicly available. This was done at three stages in the course of this thesis: Firstly, when screening the market for potentially interesting organizations to interview, and secondly, in preparation for each interview in order to be able to establish a connection to the interviewees more easily and to contextualize their answers better. Lastly, written documents were consulted if an interviewee specifically referred to a certain document in relation to a question asked during the interview. This was only done upon explicit referral through since the interviewed organizations are
different in size, governance structure (governmental vs. private) and field of business and thus do not have comparable written documents.

Analysis
All interview transcripts, websites and organizational documents have been analyzed through a qualitative content analysis in which the information has been coded according to themes developed from a qualitative evaluation of the content, which has the purpose of boiling down the content to what was actually said or written in relation to the research questions (Flick, 2014).

Applied to the different data sources, the analysis served two functions. In case of the websites and organizational documents, the goal was to obtain knowledge about the organization in the context of the research questions prior to the interview and thus be familiar with specific undertakings of the organizations that might come during the interview. It is important to note that the findings from this analysis were channeled into the interview but are not considered as formal material in themselves in the thesis due to the above-mentioned lacking comparability of documents among organizations. In case of the interviews, the purpose of the analysis was to answer the research questions.

The following questions, set a priori based on the research questions, were asked to the texts:

*Table 2: Questions (set priori based on research questions) asked to the texts*

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Questions (set priori based on research questions) asked to the text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-perceived role</td>
<td>How do actors perceive their organization’s role in Sweden’s climate neutrality goal? Who defines that role?</td>
</tr>
<tr>
<td>Drivers for sustainability</td>
<td>Which role and importance do actors assign to sustainability in their business and why? Which benefits of implementing sustainability into firm strategy are seen?</td>
</tr>
<tr>
<td>Perceptions and ways of working with sustainability innovations from startups</td>
<td>How are sustainability innovations from outside parties, especially startups, perceived, searched for and worked with? Which factors do the perceptions depend on?</td>
</tr>
<tr>
<td>Challenges for innovation</td>
<td>Which challenges to the implementation of sustainability innovation are perceived in the Swedish real estate and construction industry? How do these challenges apply specifically to startups? Which conditions would need to be given to facilitate working more easily and confidently with sustainability innovations, especially from startups?</td>
</tr>
</tbody>
</table>
Interviews
All transcriptions and complementing interview notes were read through individually to identify themes corresponding to the research questions (Flick, 2014). Based on the research questions, sub-questions – set a priori – have been asked to the text which yielded relevant key words and topics (Brinkmann and Kvale, 2015). The categorization of these into themes and subthemes has subsequently been done inductively (Pope, Ziebland and Mays, 2000).

Documents
Beyond the purpose of screening and interview preparation, for which written documents have been reviewed but not formally been collected as material, documents have been scrutinized when a respondent specifically stated them as an answer to an interview question. This way of document review was not initially planned because of the incomparability issue but has later in the project been deemed necessary due to respondents insisting on referring to the written document instead of giving a personal statement.

Adequacy and Limitations

Relationship to MIMSI
One of the aspects that was from the beginning considered to deserve particularly careful consideration was the relationship to MIMSI to ensure that the thesis project’s main aim would be to contribute to scientific knowledge and not constitute a consultant report for the company. The academic priority of this study and the thesis student’s independence in the analysis were clearly emphasized from the initiation of the relationship and consequently respected. The research questions were designed in a way so that the resulting answers would promise to also create value for other startups besides MIMSI and the further actors in the sector. In order to ensure the researcher’s independence in the analytical process, neither was the company’s office used as a workplace nor was any input from them considered unless specifically requested.

It should be clarified that several interviews were set up through the company’s contact network and that the CEO Sankara Pillay accompanied the student to two interviews with his contacts to facilitate an introduction. In one of these instances, he left the room before the interview began and in the second instance shortly after the conversation had started. Although the interview dynamic might have been influenced during the time of his presence, which could have a negative impact on the data comparability between interviews, this trade-off was deemed appropriate considering that the contribution of the data to be collected to this study would by far outweigh the possible disadvantages.

Privacy
It was ensured to respect the privacy preferences of all interviewees by getting their oral consent to audio-record the interviews as well as to use their name, position and company information in the final thesis. Some interviewees requested to see the context in which their answers would be presented first before agreeing to be personally identified, which was of course respected. It was at the same time also made clear though that interviewees could not influence the results; they only had the choice to reveal their identity or remain anonymous. One consultant could not be reached anymore after the interview for giving final consent and was followingly made anonymous.

Another privacy aspect that was thoroughly clarified before every interview was the storage and accessibility of collected interview data. This included also an explanation of the purpose of the thesis and the relationship to MIMSI, clarifying that they would not have access to any
audio or text files. All data was exclusively stored on university servers and only accessible to the thesis student and supervisor.

**Interviewee sample limitations**
As noted above, it was not possible to arrange interviews with all identified actor groups surrounding the startup. Especially in the case of architects, the omitted potential data could have made the study results richer as this actor group is not represented at all now. This is considered a limitation of the study, but the overall amount of data and actor groups represented are still regarded as a sufficient basis for a substantiated analysis based on Guest and Johnson's (2006) finding that data saturation commonly occurs between six and twelve interviews.
6 Results and Discussion

Self-perceived role in Sweden’s sustainable development

For the results in this section, patterns have been found based on whether the business core of the considered organization was rather service-oriented or product-oriented. It should be kept in mind though that this attempt of classification is meant as a range of combinations of levels of service and product focus where organizations can be seen to have a dominance of focus in one of the two areas but not a dichotomous distinction meaning that there are only the two extreme categories. This study assumes that the consultant firms as well as the governmental entities have a primary focus on services because their main business area – or assignment in the case of governmental agencies – concerns the sphere of conceptualization rather than physical products. The real estate organizations, civil engineering and construction company and the insulated glass manufacturer on the other hand are assumed to have a stronger focus on physical products than on services. This distinction is reflected in how the respective organizations perceive their role in Sweden’s climate ambition: The organizations whose focus is on products, see their role mostly in contributing to more resource efficiency in their operations while the organizations centered around services perceive themselves primarily in the position to catalyze and guide the system changes required for moving towards sustainability. All interviewees express increasing awareness about sustainability in their organizations, but as will be elaborated in the following, the integration of sustainability into the strategy of the various organizations is at different stages along the spectrum developed by Landrum (2018).

Product-oriented organizations

Product-oriented organizations’ pursuit of resource efficiency focuses on the areas that were also identified as particularly critical by Boverket (2019), namely GHG emissions, energy use and waste creation. All three real estate companies identified energy efficiency in building operations as one of their main contributions towards a sustainable sector. Malin Ribbenhed, Head of Quality and Sustainability at Stångåstaden, furthermore brings forward the company’s work with social aspects in their neighborhoods which is regarded as a key element in achieving security in the residential areas and encouraging residents to act in a sustainable way and thus contribute to the sustainability of their living spaces. Based upon their core business, the climate impact of materials and the construction process plays a major role in NCC’s work towards sustainability, especially the fossil fuel dependence of the former ones. As the Head of Sustainability points out though, this awareness has only arisen recently and lead to the company’s participation in the sector’s shared ambition to become fossil free (Fossilfritt Sverige, 2018). Christina Lindbäck, the Head of Sustainability at NCC goes on elaborating on a perceived paradigm shift in the sector from considering resources to be infinite and seeing the system’s nature as linear to acknowledging the industry as part of a natural environment that follows a cyclical rhythm. This paradigm shift reflects a move towards stronger sustainability (Landrum, 2018) and lays the conceptual ground for sustainability innovations (Steffen, Crutzen and McNeill, 2007; Commoner, 1993). She adds though that she regards sustainability as an additional element to the firm’s core business, which has yet to make its way to the center of the strategy, illustrating the challenge of sustainability implementation described by Porter and Kramer (2006) as well as Lozano (2015).

Service-oriented organizations

The roadmap outlining the sector’s shared fossil fuel independence ambition constitutes a common platform between its more product-oriented participants like NCC and the more
service-focused organizations that have committed to it, like WSP. WSP, just as ÅF, see their contribution to Sweden’s climate targets in their services and projects where their biggest potential for a positive impact lies. Just as the construction company NCC, also the interviewed consultant firms note a rather recent change in their approach towards sustainability.

“When I came to ÅF in 2013, sustainability in the solutions tended to be around [that] there is an option and there is a green option and we would put them side to side.” Sara Lindstrand, Senior Manager Sustainability, ÅF Pöyry AB

A clear shift in perspectives can be observed comparing this approach to what it is today, where sustainability in the solutions is the default way. Both, ÅF and WSP, also measure and work to reduce the negative climate impacts of their own operations but clearly emphasize that the contribution they make to the climate neutrality of the construction and real estate sector comes through the core of their businesses – their advice and solutions. Both firms point out the importance of adopting a long-term perspective for the role they play in the sector, a logical consequence when one considers that sustainability concerns ensuring a functioning earth system for future generations. This focus on the whole system accompanied by a shifting paradigm and a long-term perspective can be seen as a disruption to at least the conceptual separation of social and ecological systems outlined by Folke et al. (2011). Despite the congruence in the perceived importance, the two companies express differences in how this is implemented in the reality of their daily business. While Charlotte Hauksson, the Project Manager and Senior Advisor for Sustainable Development at WSP, underlines the attitude of the customer as a key determinant for the extent of long-term thinking adopted for a certain project, ÅF focuses on taking their customers on a journey of critically analyzing the true underlying needs and coming to a solution that addresses these needs in the most sustainable, budget-conform way, but does not necessarily yield the solution that the customer asked for at the beginning of the journey where the true needs might not have been obvious yet. This journey also tries to steer the potentially initially shorter-term focus towards a more long-term approach. The process of the described journey reflects some of the ways of working commonly identified in institutional entrepreneurs, namely the sense making and the creation of a vision (Olsson, Folke and Hahn, 2004; Gutiérrez, Hilborn and Defeo, 2011). Another aspect of the expressed role that reflects characteristics of institutional entrepreneurs is what ÅF describes as being the “spider in the web” (Sara Lindstrand, Senior Manager Sustainability, ÅF Pöyry AB), i.e. connecting innovations with organizations that have a relevant context of application and thus bringing together actors that might otherwise not find each other but have relevant synergies as described by Bebbington (1997) and Ernstson et al. (2010). The strive for acting as a connection catalyst between different actors is also expressed by the real estate firm Sankt Kors, however in the form of providing physical meeting spaces in their buildings rather than through projects. Vice CEO Anna-Maria Jakobsson describes long-term thinking in the form of considering what happens inside their buildings after the construction is completed as an important part of the company’s self-perceived role – just as much as welcoming innovation in their real estate, either in the form of construction components or young companies starting out or leaving an incubator to continue their journey in Sankt Kors’ real estate. The company sees itself as a role model of trying out and supporting innovations with the potential to grow and defines it position in the market as complement rather than competition to other real estate actors. Generally, it can be observed among the analyzed actors that they increasingly understand themselves as part of a larger system where individual components cannot operate in isolation but influence each other (Commoner, 1993).

The work of both governmental actors analyzed in this study is directed by assignments from the government. In the context of Sweden’s climate neutrality goal, The Swedish Energy
Agency has the overall goal to promote and create a sustainable energy system with the reduction of CO\textsubscript{2} as a measure of success. As a part of this, the agency has started a collaboration with the Swedish innovation system where it supports small companies with energy innovations financially and tries to contribute to the advancement of their business development. Vinnova’s aim on the other hand is to drive the commercialization of Swedish innovation in all areas. Tony Friede in his role as a Program Manager for Information and Communication Technology at Vinnova points out though that Vinnova does not have a working definition of sustainability beyond something that doesn’t harm the environment or humans. Both entities strive to bridge the Valley of Death for innovations as outlined by Auerswald and Branscomb (2003) as well as Heller and Peterson (2019).

Drivers for sustainability

Internal drivers

All three real estate companies as well as VELUX and NCC identify cost efficiencies as a driver for making sustainability part of their business, which clearly concerns their own processes and economic performance and is thus an internal driver (DeSimone and Popoff, 2000). Both VELUX and NCC, rely heavily on physical materials for their production. NCC points out the importance of matching the procurement with the actual need of materials in projects since materials are commonly overordered by a certain share to account for uncertainties that arise from the many actors involved. When overordered materials are not used in the project though, they need to be stored in a space which causes rental expenses and often, the materials are disposed of after a certain time which again creates expenses for the waste handling. For VELUX as a manufacturer, the cost efficiencies arise from material efficiency in production and the recycling or use of waste materials for heat generation (VELUX Group, 2019).

Lejonfastigheter raised the financial long-term benefits of sustainable buildings that exceed today’s regulatory standards and thus decrease the risk of facing high costs in the future in case regulatory requirements will be increased, a strategic consideration described as an internal sustainability driver by Lozano and von Haartman (2018).

A further driver for sustainability raised by the interviewees of The Swedish Energy Agency as well as Vinnova, particularly in relation to sustainability innovations, were champions; i.e. people in organizations which are brave enough to break long-established patterns and question existing structures. This links back to institutional entrepreneurs described by Olsson, Folke and Hahn (2004), Gutiérrez, Hilborn and Defeo (2011) as well as Westley et al. (2011) and also Lozano (2015). In this case, the role of an institutional entrepreneur refers to individuals within an organization rather than an organization within the context of the whole SES as outlined above with the example of ÅF.

Another aspect driving sustainability accentuated by VELUX, ÅF as well as WSP is the positive impact on the planet from companies truly aligning their work with sustainability. Although this might not provide tangible benefits in the short term, maintaining the ecosystems that companies depend on for their own operations is crucial in the long-term if the business still wants to exist in the more distant future. This argumentation can be linked to several aspects. Firstly, it reflects again the increasing adoption of a SES thinking, acknowledging that all parts are interdependent and moving away from their conceptual separation (Commoner, 1993; Steffen, Crutzen and McNeill, 2007; Folke et al., 2011). Adding to the interlinked nature of the SES, this driver for organizational sustainability recognizes that the current SES can only for sure operate within certain ecological boundaries as outlined by Rockström et al. (2009) as well.
as Steffen et al. (2015) and that going beyond those boundaries might tip the system into an undesirable basin of attraction (Steffen, Crutzen and McNeill, 2007).

**External drivers**

While the motives for incorporating sustainability into business described so far constitute drivers from within the company, the analyzed organizations also perceive external drivers for working towards sustainability.

Both Vinnova as well as The Swedish Energy Agency as governmental institutions are governed directly by decisions from the Swedish Government and have limited room to shape their operations beyond the tasks assigned by the government. Their main driver can thus be said to be legislation. The three municipality-owned real estate companies also find themselves in a setting where public demands influence their operations, namely through the owners’ directive which sets out sustainability as one of several focus areas for the businesses. They are furthermore expected to contribute to the municipality’s goal of becoming carbon neutral by 2025. These examples illustrate the significance of legislation and regulations as a driver for sustainability in public organizations as found by Walker, Di Sisto and McBain (2008). On the side of private organizations in this study, NCC assigns a significant role to legislations as well for their operations to become more sustainable. The Head of Sustainability emphasizes how legislations set clear directions for the company and through this support a systematic approach towards the concerning topic. For the case of sustainability, she gives the example of nearly zero-energy buildings, which the EU has made a mandatory aim for all new constructions until the end of 2020 (European Commission, 2010). At the same time, she also expresses difficulties for a construction company like NCC that has traditionally quite low margins to work with sustainability systematically if it is not required by law because their customers are typically not willing to pay a price premium for the added long-term or intangible value. The other analyzed private companies give legislations considerably less weight as a driver for their sustainability.

Besides legislative demands, pressure from stakeholders is driving organizational sustainability (Lozano, 2015). For the actors at hand, especially customers, other companies and employees were identified as such stakeholders.

All organizations express that they see a slow but steady trend of the sector moving towards sustainability. Consultant 1 describes the demand for sustainability from the firm’s customers as follows: “Everybody is talking about it. All customers want it!”. Also WSP articulates a clear ambition of the company of “[…] being part of a sustainable development; not just doing something good, but being part of something that is sustainable” (Sofia Nyholm, Head of Corporate Sustainability, WSP Sverige AB). These perceptions reflect “increased levels of social awareness of sustainability” (Lozano and von Haartman, 2018, p.516), which the latter authors found to be the most influential external sustainability driver. Following this trend is perceived essential to “stay competent and competitive” as summarized by NCC’s Head of Sustainability. Lina Hallberg, Head of Technology and Energy at Stångästaden, adds that the company is not seeing an increasing demand for sustainability in their own tenants at this point but is anticipating it in the future and thus considers it already today.

**Connecting drivers**

In order to create a more holistic view on organizational sustainability drivers, Lozano (2015) complements the commonly used model of external and internal drivers with a connecting layer, for which they find “reputation” to be most important, which is reflected in the organizations’ perspectives.
Sustainability is considered important in context of reputation on the one hand as a part of the brand representation towards clients – or tenants in the case of real estate – and on the other hand as a crucial factor in employer branding, especially towards younger, future employees. All interviewed consultant firms as well as Sankt Kors and Stångåstaden point out sustainability as an important factor in the attractiveness towards clients/tenants, while specifically WSP, ÅF and Stångåstaden also emphasize sustainability as a key element of attracting and retaining talent. A company’s success in branding is very much dependent on the credibility of its outside representation as Delmas and Burbano (2012) highlight and as is also brought forward by the Senior Sustainability Manager of ÅF as well as Consultant 1. Both emphasize that in their opinions, such credibility stems from genuine involvement of a company into striving for sustainability, particularly when it comes to attracting young, new talent.

“I think the students today, they can see through if you are only doing it [working with sustainability] for brand purposes. They will not go for that.” Consultant 1

“[…] if you want to attract talent, if you want people to work in your company, you have to be credible and you have to take these issues [sustainability] seriously. If you’re not, you’re not gonna be around because nobody wants to work at your company if you continue to diminish the environment or actually ruin ecosystems that you’re relying on yourself.” Sara Lindstrand, Senior Manager Sustainability, ÅF Pöyry AB

In relation to credibility, Martin Pors Jepsen, VP of the VELUX Innovation Center, raises the aspect of doing things that are true to the company’s identity or DNA, which in the case of VELUX is to take a sustainable approach towards their business as the company has determined from their early days in their “Model Company Objective”, a commitment to “create value for the company and for society, while behaving responsibly towards all […] stakeholders in daily business” (VELUX Group, 2019, p.6). This links the aspect of credibility to the spectrum of weak and strong sustainability as described by Landrum (2018) and shows the need for sustainability to move to the core of an organization’s strategy as opposed to having it as an unrelated addition to enfold its full potential.

The matter of credibility through doing what is in line with the company’s DNA is picked up again in connection to strategic business development. Applied to sustainability, the consultant firms’ sustainability managers bring forward the SDGs as a critical tool to evaluate new business opportunities in order to ensure that the development of the company is positively contributing to the world’s overarching goals of becoming sustainable. This connects to Porter and Kramer’s (2011) argumentation of companies venturing into the area of sustainability to tap into new chances of creating business. Beyond serving as a “filter” for arising business opportunities, ÅF and WSP also point out the further-reaching implications of aligning business with the SDGs: It enables them to understand the sustainability goals of their clients and in turn provide value to them by advancing the latter’s contribution to a sustainable development. This can benefit the client, inter alia, in the ways described in this section.

Based on the interviews at hand, the dominant presence of external drivers found by Walker, Di Sisto and McBain (2008) as well as Lozano (2015) cannot be identified in this study. Rather, drivers from all spheres motivate the organizations’ strive towards sustainability and the benefits of moving it to the core of the firm strategy are increasingly recognized and acted upon.

Perception of and set of working with innovation from startups

This section aims to draw a connection between the urgency for novelty and innovation to do things differently brought forward by scientific literature and the perception of and approach
towards sustainability innovation, especially from startups, of actors in a sector that shows to play a critical role in sustainable development.

**Perceptions of innovations from startups**

As above, this section will adopt a partition of actors in more product- and more service-oriented entities because common themes have noticeably occurred along these lines. For the more product-oriented organizations, a clear pattern of risk-adversity towards disruptive innovations, especially from startups, can be seen in various nuances. As Lejonfastigheter as well as Stångåstaden express, they do not want their real estate to be a “testbed” for innovations that have not been verified in other projects before. An exception to this constitutes the project *Ebbepark*, a new neighborhood currently under construction in Linköping which combines commercial and residential spaces and is set out to take novel approaches to being a sustainable part of town (Ebbepark, 2019). Stångåstaden as well as Sankt Kors, the real estate companies behind the project, articulate eagerness to try out innovations in this neighborhood. Despite this eagerness though, public real estate companies are restricted to some degree by the law of public procurement allowing only the direct purchase of items that are below the price limit of requiring a tender process, as Robert Bäckström of Stångåstaden brings forward. Playing into the business of Sankt Kors to be a growth enabling environment in Linköping, Anna-Maria Jakobsson articulates the company’s wish to have young, passionate companies as tenants. The statement of eagerness to try out things in the new neighborhood is limited by MIMSI expressing that they considered being part of the project but in the end faced the argument that their product was not developed far enough. The line of risk averse tendencies towards startups extends further throughout the more product-oriented companies to NCC who emphasize the importance to work with innovations in “safe” experimental spaces, i.e. having dedicated trial projects for innovations where the company is also allowed to fail in some smaller, obviously not life-threatening aspects and correct things along the way according to the gained insights without risking its reputation or even legal consequences. This approach towards novelty is also brought up by Stångåstaden through the example of an experimental apartment the company had set up for an exhibition. The Project Leader of New Construction notes that such apartments serve as a learning opportunity and source of inspiration, but are too expensive to be repeated on a regular basis. The manufacturer VELUX only recently started considering startups as a source of innovation for their business according to Martin Pors Jepsen. None of these companies explicitly expressed a sense of urgency with regards to innovation for sustainable development.

When looking at the more service-oriented organizations on the other hand, ÅF stands out with the following statement:

“[…] we can’t innovate everything from scratch ourselves, so we need to partner with companies that have technologies. That’s from my perspective, because if we don’t, other companies are going to do it instead.” Sara Lindstrand, Senior Manager Sustainability, ÅF Pöyry AB

This statement illustrates on one side the role of innovation as a competitive advantage as described in management literature by e.g. Drucker (1985) or Freeman and Soete (1997) and on the other side unveils a sense of urgency to innovate at a fast pace, which is not expressed by other actors. This account furthermore recognizes the need for collaborations to achieve such a fast pace. Drawing the line back to sustainability innovations and their underlying acknowledgement of all the parts in the SES affecting each other (Steffen, Crutzen and McNeill, 2007), this illustrates synergies for a sustainable development that can be created when thinking in terms of the whole system instead of only an individual entity. Both ÅF and WSP, have
strategies for long-term thinking in projects in place – aiming to ensure that solutions designed today will still fit or be accommodating to our needs in decades to come – but Charlotte Hauksson points out that there is no incentive to bring innovation into projects beyond what the customer demands and is willing to pay for considering the risk that more novel technologies can bring. She further highlights that even the highest environmental certification schemes do not require technological solutions beyond what is readily available today, providing no incentive for the use of innovation with a high degree of novelty. Linking back to sustainability drivers according to Lozano and von Haartman (2018) and the identification of increased awareness about sustainability in society, it can be anticipated that building certifications could become a critical factor for a real estate firm’s reputation. This is complemented by Stångåstadén’s Head of Technology and Energy’s expectation to see a higher demand for sustainability from tenants in the near future. Thus, setting the requirements of the highest grade of certification above currently available solutions could serve as an incentive to incorporate more innovations with a high degree of novelty into projects and drive a sustainable development of the sector. The important role of the customer in driving the demand for more or less novel innovation constitutes a common denominator between the more product and more service-oriented organizations in the perception of innovations from startups and the expressed need of the latter ones and is also emphasized by NCC and VELUX as Martin Pors Jepsen says:

“When we look at what we do [in terms of innovation], [...] it’s very business-driven towards a need and that need can be short-term – it could also be long-term – but it’s certainly always targeted towards a customer [...]” Martin Pors Jepsen, VP VELUX Innovation Center, VELUX Group

This indicates that innovation in real estate and construction is, in contrast to the overall development, still demand rather than supply-driven (Westley et al., 2011). Thinking of the metaphorically double-edged sword of innovation in the context of sustainable development (Westley et al., 2011), it is on the one hand favorable for the environment that things are only created on demand and not speculatively introduced to the market, trying to create sales, but at the same time does the strong reliance on demand-pulls slow down the rate and success of novelty.

Vinnova, with its core being the commercialization of Swedish innovation, obviously holds a favorable perspective of novelties in all fields. The principle of equal access plays an important role in their work which is why their calls are open to everyone and every submitted proposal that is in line with the theme of the open call is considered for financial support. The Swedish Energy Agency has traditionally not worked with startups as a source of innovation, but has recognized the potential and thus launched a cooperation with the innovation system to support energy system innovation. In contrast to Vinnova, The Swedish Energy Agency’s support scheme also includes matchmaking of startups and large organizations in search of innovations; a process supported indirectly by Vinnova through their financing of Ignite Sweden, but not within the core of their operations. A key criterion for the support from either agency is the viability of the innovations, particularly underlined by Sasan Shaba, Portfolio Manager and Business Developer at The Swedish Energy Agency, pointing to the scalability potential of a solution – also internationally – in order to really leverage its positive impact.

Channels for innovation

The different actors highlight a number of channels employed to find innovations from external parties, albeit not only from startups. These channels are used with varying frequency and systematisms. The approaches of organizations further differ in whether the channels are used more passively, meaning that the organization opens up for outside parties to find them, or for
active scouting. Overall, the channels of finding innovation show no distinct pattern between the more product- and more service-oriented organizations, but rather follow a common tendency of risk reduction. Firstly, it can be said that no analyzed entity had a system in place for actively screening the startup community for potentially relevant innovations at the time of the interview. Charlotte Hauksson of WSP as well as Robert Bäckström of Stångåstaden emphasize the role that the individual consultant or project manager plays in informing themselves about developments in research and the market and taking initiative to pitch interesting innovations to be implemented. Both, Stångåstaden as well as Lejonfastigheter indicated construction firms in their projects as an important source of innovation for them.

“[…] and our contractors have a huge part in this [being a channel for innovation]. I would say, because they know a lot about where the field is going and we ask them what’s new and “could we do something like this?” and they have ideas. They have a huge impact for us, their ideas.” Lina Hallberg, Head of Technology and Energy, Stångåstaden

Looking at the structure of a construction project, which typically has architects and consultant in between the real estate and the construction company though, it becomes evident that the terms under which the construction company is hired for the project play a critical role for how much innovation they can actually contribute.

“[How much innovation NCC can contribute] varies from customer to customer. It has a little to do with the contract form that we are hired under. Sometimes, we do have a contract form when we do not have so much choice, […] they [the customers] just say “Build this!” and they have everything in place. Then, of course, our ability to influence is zero. But if we work with the contract form “partnering” for instance, or if it is a design-build [project] where we have a large possibility to influence, [then] we have different ways that we come about [innovation] […]” Christina Lindbäck, Head of Sustainability, NCC Group

This illustrates how actors within a project rely on each other as channels of innovation, but also underlines how the commonly loose ties between parties (Dubois and Gadde, 2002) coupled with the limits of human ingenuity in overseeing highly complex systems (Westley et al., 2011; van der Leeuw, 2010) result in risk adversity and can hinder the effective spread of innovations, especially if they are to be located at a higher, more systematic level.

A frequently mentioned channel for innovation are university collaborations in different forms. All three real estate companies assign an important role to the idea input coming from academia for their projects. Two of them are furthermore members in the research network Hällbar Region, connecting Linköping University with real estate and energy actors for better cooperation and coordination. NCC and VELUX also point out the role universities play for their innovation in their business. VELUX employs the approach of leveraging students’ creative potential and technical skills to explore areas that might be of value to the company’s core mission of bringing daylight and fresh air through the roof but are not currently on the development agenda because there is no concrete customer project ongoing at the point in time. Martin Pors Jepsen explains that such activities are a regular part of VELUX’ business and are regarded as highly valuable since they present a low-financial-risk opportunity of reducing path dependencies faced by established organizations (Hannan and Freeman, 1984; Hill and Rothaermel, 2003).

Another public source of innovation besides universities are public actors of the innovation system, such as incubators and science parks, which are brought forward as an important origin of innovation by Sankt Kors, The Swedish Energy Agency as well as ÅF. Tony Friede of ÅF
as well as Anna-Maria Jakobsson of Sankt Kors explain their active search within these communities for building relationships with entrepreneurs whose innovations are either of interest for a current or potential future project. The Portfolio Manager and Business Developer of The Swedish Energy Agency on the other hand, communicates the expectation of being contacted by the respective local innovation system entity if there are startups that might be of relevance for The Swedish Energy Agency’s mission. Cleantech Östergötland is an example for networks within the innovation system that Stångåstaden as well as Sankt Kors bring forward as what they consider an important information source.

Complementing the publicly governed innovation system as a source for novel ideas are private industry networks. VELUX indicates their approach to collaborating with outside companies to date has been through private company and industry networks where specific, needed competences can be easily located. Industry events such as congresses and business fairs are named as other platforms where relevant innovations are found, which is in particular brought forward by the consultant firms. While Tony Friede in his role as an Innovation and Growth Hacker at ÅF illustrates how he personally uses such events as an opportunity to get to know startups, Charlotte Hauksson accentuates the dependence on the individual consultants’ interests and explains thus that in general it is mainly startups seeking to come in contact with WSP rather than WSP selectively scouting startups through this channel. A further occasion where WSP says to meet startups are concrete projects. When startups learn about a planned construction and see a fit, they often take the initiative to reach out to WSP. This process is also described by Maria Widfeldt of Lejonfastigheter who names ongoing projects as a basis for startups to contact them.

A further platform for engaging with startups is found to be companies’ accelerator programs as presented by Bauer, Obwegeser and Avdagic (2016) and exemplified by WSP’s program GroWSPark. Charlotte Hauksson describes the program along the same lines as also Tony Friede in the conversation about Vinnova, describing companies’ own accelerator and incubator programs as follows: They have a rather narrow focus on concrete, current needs of the corporation and favor innovations that can create cost-efficiencies for them promising to deliver a good return on investment, but tend to be along the lines of the company’s previous path rather than disruptive.

Challenges to innovation

The Industry Structure

Many of the challenges are rooted in the structure of the industry. As outlined above, construction projects are typically characterized by a multitude of involved actors that come together on the basis and for the duration of said project. The actors will not necessarily work together in the same constellation at a later point in time though and even if it be so, then the high degree of individuality of each project will likely pose different challenges (Bygballe and Ingemansson, 2014). Emphasizing what has been outlined by Dubois and Gadde (2002), Christina Lindbäck of NCC points out the lacking centralization of knowledge and information gained on a project level as a major challenge to innovation in the sector, because it shifts the learning outcome of a project from the level of the organization to the individual. This is not specifically related to startups’ struggles in the sector, but concerns innovation in general.

The dependence on individuals is not only brought forward in the context of learning, but furthermore also plays a role even before a building starts to be constructed as briefly touched by Robert Bäckström of Stångåstaden above. He illustrates this trough the example of his role as a building project manager, saying that the collection of innovations to be implemented in
the project depend a lot on his own interest and effort to inform himself about developments in the sector. It does not end at the point of gathering information, a following challenge is to propose innovations to other employees in the company involved in the project as well as the persons running the building once it is finished. He highlights the resistance and skepticism often faced in this stage due to uncertainty about possibly occurring, unexpected costs as well as unprecedented technical problems the staff maintaining the building might experience with new technologies. Besides needing to convince others, he also explains his own dilemma of having to conduct calculations for the project since the project manager is responsible for managing the finances of it. A major challenge perceived in this is a low trust into sellers, especially of novel products that have not been extensively applied in other projects before, because there is a skepticism that these sellers will present varnished performance calculations of their products to increase their sales. Since project managers cannot possess extensive enough knowledge about all technological aspects of products, it can be difficult for them to do their own, reliable calculations to validate the sellers’ claims. All these factors combined result in a negative correlation between an innovation’s degree of novelty and the incentive for the building project manager to work with it. The decisive position of the individual is also highlighted by Charlotte Hauksson pointing to the initiative or lack thereof taken by individual consultants. This observation concerns the level of the individual firm and illustrates a critical connection between the micro and meso level of society to facilitate innovation (Christensen and Bower, 1996; Westley et al., 2011).

Taking a project-level perspective, the imbalance of dependence shifts towards the real estate companies as WSP, NCC and ÅF state. Since the real estate firms are the ones commissioning a building, they determine several parameters in the project influencing the opportunity to implement innovation as well as the sustainability and long-term focus of a building. Not only is the building project manager of the real estate firm him- or herself in the position to suggest and implement innovations, but his or her ambitions are commonly also laid upon the hired construction firm as well as consultants if they are part of the project. This is illustrated by Christina Lindbäck’s example of contract forms determining NCC’s innovative incentive and freedom which are set by the real estate firm and complemented by Charlotte Hauksson’s description of how the real estate firms’ long- or short-term set of working determines the project approach of the consultants. On the topic of adopting a long-term perspective to truly be able to see the impacts of choices made for buildings, Stängåstaden points out the constraints in budget with regard to tenants needing to be able to afford the housing provided. From the perspective of energy innovation, Sasan Shaba also talks about the often-lacking long-term thinking in real estate and construction which is needed to really see the financial benefits of energy innovations.

"Most of the time, it’s about the money. People don’t buy something because ‘Oh, this costs a little bit more but I’m saving the planet, I’m saving the CO₂ emissions’, nobody cares about that. The first thing they check is like ‘What’s my return on investment?’ In order to reach the tipping point of nudging behavioral change to think about the climate more, we need new business models and solutions that actually can create a change of behavior” Sasan Shaba, Portfolio Manager and Business Developer, The Swedish Energy Agency

Anna-Maria Jakobsson of Sankt Kors, Charlotte Hauksson of WSP and Christina Lindbäck of NCC all express a focus of construction firms on cost as well with the reasoning that in contrast to companies selling to private customers, business-to-business customers in the case of real estate are commonly not willing to pay a price premium for intangible value, especially if there is no proven way of determining its monetary benefit. This is a major obstacle when considering
that the time frame of sustainability is per definition a long one (World Commission on Environment and Development, 1987) and leaving humanity’s current, unsustainable trajectory requires a transformation at system level, thus going beyond the profits of the individual firm (Westley et al., 2011).

An issue with the imbalance of decision power towards real estate firms is that they often have little knowledge about how to navigate in the innovation landscape and how to set the terms for other parties in the projects in order to pave the way for the implementation of sustainability innovation. The consultant firms, NCC as well as all three interviewed real estate companies elaborate on this issue from different angles. While the construction and consultant firms see themselves more or less limited depending on the customers’ choices, the real estate firms identify not having the right channels and platforms for information as one hurdle in their work with innovation and the way of actually collaborating with startups as another one as illustrated in the following:

"Ebbepark, we want to use it like a test bed, a demonstration area, like ‘come here and try new stuff’, but we really don’t have the right channels. We’ve been talking to the university and with companies in the cleantech sector. [...] We are really open to companies coming here, but we found it hard because in the dialogue so far with the university, we don’t really know to whom we should speak or how [...] we should spread this information." Anna-Maria Jakobsson, Vice CEO, Sankt Kors Fastigheter AB

" [...] we don’t know any of the new companies on the market and they don’t have time to tell everyone that they are in the market, so I think networks are a good thing [to meet]. [...] There we can maybe dare testing to develop things together or trying them in buildings” Maria Widfeldt, Head of Sustainability, Procurement and Communication, Lejonfastigheter AB

As a result, the real estate companies see the local government as well as the innovation system in the responsibility to create more effective platforms and networks, but also recognize their own role in searching for information more actively. Sankt Kors as well as MIMSI both shed light not only on the number of existing initiatives for this purpose, but MIMSI questions the relevance of some of them and Sankt Kors calls attention to lacking communication about existing initiatives.

A further hurdle to innovation arising from the industry’s fragmented and decision power-imbalanced structure is risk adversity, which has been pointed out by all interviewees as a defining mentality in the sector. The following statement encapsulates the core of this issue:

"The biggest challenge is the asymmetry in risk versus reward for innovation within infrastructure.” Tony Friede, Program Manager Information and Communication Technology, Vinnova

The reward of successfully implementing innovations into buildings will mainly be enjoyed by the entity owning it later, i.e. real estate firms. It might possibly also contribute positively to the reputation of the construction or consulting firm which facilitated the implementation, but this chance is far outweighed by the risk these organizations take for bringing novelty and innovation into the project – given the contract form leaves room to do so. Charlotte Hauksson of WSP, Tony Friede in the conversation with ÅF as well as Stängståden all highlight the differences in risk adversity depending on the nature of the innovation in question though: Firstly, the willingness to implement smaller innovations with a high degree of novelty and thus a risk of unforeseen consequences, is bigger than for larger innovations. Secondly, it plays an important role whether the innovations concern structural on non-structural parts of the
building, i.e., whether a possible failure in the technology would critically impact the stability of the building or whether the failure would “only” result in costs and inconvenience, but not threaten lives. Lastly, the cost of the innovation is a determinant for the willingness to take risk. Higher investments mean higher risks in case the innovation does not function as expected. This illustrates the practical implications of the dimensions of innovation employed to define the concept beyond its notion of newness.

Two main concerns raised in relation to taking risks through the implementation of more novel innovation are the possible legal as well as reputational consequences in case something goes wrong.

"[...] a building is very permanent and should be there for a long, long time and what happens then if you build in something that shows to create risks or whatever? It is a liability question, of course, where everyone who is involved tries to give this liability to someone else. And then, of course, this behavior is being developed of being very risk-avert, unfortunately. ” Christina Lindbäck, Head of Sustainability, NCC Group

In Sweden, Construction firms like NCC bear the liability of the structural safety of their produced buildings (SFS 2010:900), i.e. the less certain an innovation is to function perfectly, the higher the threat to their business. This poses a particularly critical problem in the case of startups who have developed innovations with a high degree of novelty but are in the initial stage of trying to sell them into projects, meaning they still lack previous references. Tony Friede illustrates this dilemma with an example of when he was involved in some companies trying to get an innovation into a large building project:

"They [the startups] proved beyond a reasonable doubt that if their tech was involved, they could have reduced the physical size of the heating and cooling requirements by at least like a 4.5. So in the same height of the building, they could actually have a minimum of one more additional floor of floor space that they could sell. Huge economic win, right? The construction wouldn’t talk to them, because 'Where else have you done it?' – 'We haven’t done it anywhere yet. We got this innovation, we proved that it can work and everything, but you would be the first real, serious installation,’ and they are like “Thanks, but no.’” Tony Friede, Program Manager Information and Communication Technology, Vinnova

Besides liability issues, companies face risking their reputation in case something with an innovation they brought into the project goes wrong. This is emphasized by Christina Lindbäck of NCC, Charlotte Hauksson of WSP, but also came up in the conversations with Lejonfastigheter and Stängåstaden. Christina Lindbäck points to the problem of not being able to close the loop of learning because on the one hand, every involved organizations fears failing in front of their customers, but at the same time, it is through trial and error how learning happens. This provides an explanation for the wish of trial projects expressed by several actors. It furthermore exemplifies a conflict between reputation driving the adoption of sustainability into firm strategy on the one hand as outlined by Lozano and von Haartman (2018) and the fear of harming one’s reputation as a barrier to novelty.

Another challenge arising from the structure of projects in the real estate and construction sector is based on the time dimensions of projects. Sara Lindstrand identifies the different timelines of construction projects and the rest of the technological development, which happens relatively much faster. This puts on the one hand time pressure on construction firms to drive the building process at the fastest possible pace – leaving no room for experimentation with innovations – and on the other hand creates another source for uncertainty because something that could be
state of the art technology in the planning phase of a large project could have become outdated upon completion of the project.

As this risk adversity arising from, inter alia, the above-described conditions, is a well-known struggle to innovation in real estate and construction, project collaboration platforms trying to centralize the risks can be seen as a recent response in Sweden as Tony Friede points out. Such platforms bring together a variety of stakeholders – e.g., municipalities, academia, contributing firms and future tenants – from the very beginning of a project, often under social and environmental goals. This way, demands and ideas from all parties can be considered in crucial planning decisions which are often taken in the early stages of a project. At the same time, the collaborative approach also opens the dialogue about the desired openness towards and sharing of risks among different actors.

**Governmental Influence**

Further factors contributing to difficulties for innovations in the sector, especially coming from startups, are current regulations.

A major theme in relation to regulation is the law of public procurement in Sweden. Stångåstaden, Sankt Kors as well as The Swedish Energy Agency bring forward that the process of publicly procuring goods leaves little room to test a concrete innovation since the procuring firm only gets to specify desired functions and then needs to accept the tender with the lowest price fulfilling these. Applying the requirements of public procurement specifically to startups, WSP, Stångåstaden and The Swedish Energy Agency further explain the arising issues due to the burden of bureaucracy that the tender processes create, which a startup often does not have the resources to handle. Additionally, public organizations might have certification requirements towards their suppliers that startups cannot fulfill simply because they could not handle the bureaucracy as well as costs of obtaining certifications yet, as Lina Hallberg of Stångåstaden says.

Another point raised by ÅF as well as Sankt Kors is the fact that negative externalities are not priced yet in many areas, which artificially makes an unsustainable business case seem more financially attractive than a sustainable option, emphasizing what has been outlined as a hurdle to an SES transformation by Westley et al. (2011).

Tony Friede shines light on challenges arising from the way the government gives assignments to different governmental institutions. He describes it as “fads and fashions” and goes on explaining how a certain program might be set up and funded by the government and then simply be discontinued or disruptively changed after it ends. This leaves the previously funded area and the involved people at the risk of failing since they might be dependent on the financial support provided through the programs. Furthermore, the assignments are not always in line with the actual core remit of the governmental agency and might thus not be within their immediate area of expertise. This can on one hand lead to confusion between institutions if their missions suddenly overlap, but also leave the agency newly assigned to the purpose without sufficient knowledge of how to fulfill it.

**Innovation system failure**

Besides regulations, a number of failures in the Swedish innovation system were identified as posing hurdles to sustainability innovation in the sector.

Due to the risk adversity arising from the structures of the industry, the Valley of Death for innovations in construction and real estate is extraordinarily long. Innovations with a high degree of novelty have to be proven many times before they earn sufficient trust to become...
economically viable as Charlotte Hauksson, Tony Friede, Sankara Pillay of MIMSI and Sasan Shaba point out. Sankara Pillay as well as Charlotte Hauksson criticize the innovation system for not bridging this Valley of Death sufficiently because the governmental agencies provide money but do not actually support startups in testing their product which they critically need to become viable. A further critical success factor, especially before the Valley of Death is crossed, are the people working in a startup as Tony Friede highlights. In his position at Vinnova, one major drawback of the innovation system he encountered was that he could only support entrepreneurs with money but his call to also focus on human resource support fell on deaf ears. Sankara Pillay reinforces this point by describing how an effort of the innovation system in Linköping to connect inventors and driven business people for startups has not yielded any results in the intended sense.

Besides the innovation system not being fit for the long and harsh Valley of Death in construction and real estate, Charlotte Hauksson describes it as maladapted to the involved actors and their ways of working. Drawing back to the lacking knowledge of real estate firms, she describes how many of them call consultants in for projects to “bulletproof” technologies. Since there is no business case for consultant firms to constantly keep themselves updated on the very latest innovations from startups that have not been verified yet, they might not take the risk of advising in favor of a highly novel technology in a project, which then can cost a startup a critical chance to verify their solution. Charlotte Hauksson thus calls for an innovation system that recognizes the critical role of consultants in the sector and therefore gives them incentives to work with highly novel innovations. This does not only show the need for intervention from governmental and intergovernmental organizations to facilitate systemic innovation as laid out by Westley and Antadze (2010) and Hillman et al. (2011), but first and foremost underlines the critical importance of an in-depth understanding of the system and the ability to adapt it to changing circumstances to enable transformation.

Another challenge to innovations from startups is the access and process of funding. Vinnova provides grants for innovations that fulfill the requirements of their open calls, but as Tony Friede explains does the fact that applications to open calls are relatively easy to make lead to companies using Vinnova funding as a kind of “lottery ticket”, lowering the average quality of incoming applications. Sankara Pillay furthermore elaborates on the grant money being shared among a large number of applicants due to equal treatment instead of consequently focusing only on the most promising innovations and entrepreneurs, leading to many startups only getting a fraction of the support they would need. Sasan Shaba explains how The Swedish Energy Agency has developed an approach of working together with the innovation system and supporting energy innovations with grant money but also connecting them to large, international investors. Sankara Pillay brings forward though the extensive reporting requirements that government agencies such as The Swedish Energy Agency have, creating a bureaucratic burden for startups.

In addition to straining startups’ resources through governmental reporting, also collaborations with large corporations can pose such challenges as Tony Friede exemplifies through his own experience as an entrepreneur before working for Vinnova or ÅF:

"They [a large corporation] loved the idea and they said: 'Tony, get the hell out of here. We will crush you. We won’t want to, we won’t mean to, but our systems and everything are so heavy and you’re so young. We will crush you and there will be nothing left. Go away, get some customers of your own, come back when you can stand on your own two feet, because we can’t help guide and nurture you’”" Tony Friede, Innovation and Growth Hacker, ÅF Pöyry AB (speaking about his time as an entrepreneur)
Sasan Shaba contributes his observations of matching startups and corporations and points out that large firms are often not used to partnering with very small ones, leading to communication and expectation issues. Cristina Lindbäck adds – from the perspective of a corporation – that startups, even though they might have a product relevant to a large company, often do not have the “production muscle” to cater to the quantitative needs of the corporation.

Mindset & Culture

A final, large theme that occurred in relation to the challenges to sustainability innovation in the Swedish real estate and construction sector are the mindset of individuals and culture of the industry as well as the society.

Firstly, all actors except for VELUX described the culture of the sector as dominantly conservative. Martin Pors Jepsen contrastingly says:

"[…]I think the building material and construction industry has the reputation to be very conservative and their customer habits change slowly and we’re still building in the same way we did many years ago and we’re still facing the same problems etc.. But I’m not sure that’s completely true. It’s true that there is something about the dynamics of how the industry works, but there is also something about that when you give something to customers that fits something that they needed, then they are very, very eager to pick up on innovation, very eager. So when I look at the customer side, I think we’ve had for sure many examples where we failed in meeting a customer need and if we were a little bit self-satisfied, we could say: ‘Oh, but that’s because it’s very conservative’, but we’ve also had a lot of successes, where people have simply picked up on an innovation that we came with. They weren’t particularly conservative, we just innovated something that they needed. It’s very dependent on our ability to meet a customer’s needs.”

Martin Pors Jepsen, VP VELUX Innovation Center, VELUX Group

This statement underlines the demand-driven nature of innovation in the sector and at the same time lets the previously-identified pattern of risk-adversity shine through in form of actors not wanting to take a risk with innovation slightly outside the needs at hand that will likely translate into a good return on investment.

In the larger innovation system, which also includes academia, counteractive incentive systems are observed, creating a mindset among researchers which hinders the commercialization of their innovations, as Sasan Shaba of the Swedish Energy Agency, Anna-Maria Jakobsson of Sankt Kors but also Sankara Pillay and Viktor Elofsson of MIMSI describe. Since the measure of productivity and success for researchers are their number and popularity of publications and most researchers do not consider themselves “business people”, many innovations potentially valuable to society’s sustainable development will stay within labs of universities.

Zooming out even further and looking at the whole culture of Sweden, a distinctive pattern of diplomacy, sometimes resulting in reluctance to openly discuss problems in order to avoid confrontation, can be observed as pointed out by Sankara Pillay. Although such diplomacy is certainly not per se negative, it can pose a challenge with regards to innovation and making the system even better as it might slow down finding solutions. This aspect draws upon the strongly local nature of construction and real estate, in which the culture of the country plays a particularly significant role (Segerstedt and Olofsson, 2010).
7 Conclusion

This section links back to the aim of this thesis to explore the conditions for sustainability innovation from startups in the Swedish real estate and construction sector in the light of Sweden’s target to achieve climate neutrality by 2045. It will provide answers to the research questions and conclude with recommendations drawn from the findings as well as suggestions for further research.

Perceived need for sustainability innovation

Analyzing the self-perceived role of actors surrounding the startup in Sweden’s strive towards climate neutrality, patterns are found along the lines of organizations with a more product-oriented and more service-oriented business core. The more product-oriented organizations see their contribution to Sweden’s climate goal in increasing resource efficiency. The more service-oriented organizations’ self-perceived role is about providing good advice and facilitating change.

A trend of increasing perceived importance of sustainability is observed, albeit to a varying degree and for varying underlying drivers. While in some organizations, sustainability has evolved into an elementary part of their core business, it is still considered a rather unrelated addition in other organizations. The dominance of external drivers for sustainability cannot be confirmed by this study; rather a balanced mix of different layers of drivers has been found.

Regarding the overall perceived need for sustainability innovation, little sense of urgency to drastically change business as usual is expressed despite the sector’s significant role in achieving the country’s climate targets and the relatively short available time span to achieve progress.

Conditions for sustainability innovation

The actor’s perception of sustainability innovations, especially coming from startups, is characterized by risk adversity. The higher the degree of novelty in an innovation, the higher the reluctance to work of the actors to work with it tends to be. This has been found for both, product and service innovations, but is stronger for product innovations, especially if they concern critical parts of buildings.

None of the interviewed organizations had a systematic way of screening the market for innovations from startups and working with them. Some organizations have their own startup accelerator programs, which are narrowly in line with the companies’ core business though and tend not to be of explorative nature.

The commonly occurring pattern of risk-adversity can be explained by several challenges present in the sector.

Firstly, a strong imbalance between the risks and potential rewards of working with innovations can be observed on an industry as well as organizational level. On an industry level, the rewards of successfully implementing an innovation into a building will be reaped mostly by the real estate firms. The risks of introducing an innovation on the other hand, are skewed towards actors further up the value chain, such as construction and consulting firms. Based on this, a strong reliance on real estate firms to demand sustainability innovation can be observed. The real estate firms see themselves limited though by lacking knowledge about the innovation landscape as well as demands of public procurement. Project platforms aiming to facilitate an
easier exchange of necessary competences at an early stage of the project are found to be a good start to addressing the imbalanced structures.

On an organizational level, individuals have shown to play a crucial role in advancing innovations. This offers the opportunity for internal sustainability champions/institutional entrepreneurs to act as connectors and sense-makers between actors on different levels, bringing together relevant innovations and people. Given the rather conservative character of the sector and resulting tendency towards incremental innovation, the significance of champions is tremendous for making connections that facilitate the adoption of disruptive innovation fast enough to take the necessary steps towards reaching the climate targets.

Besides the nature of the sector, the innovation system itself creates obstacles to the adoption of startups into the real estate and construction sector. Firstly, it does not consider and incentivize all relevant actors and secondly, the support system for entrepreneurs focuses on money rather than concrete support to test innovations, which is direly needed in construction. Additionally, the monetary support is often spread among a number of prospects instead of concentrating it only on the most promising ones, leaving entrepreneurs under pressure to constantly dedicate time to applying for smaller funding sums – time which could otherwise be invested into other important aspects of advancing their innovations.

Furthermore, there are no sufficient policies in place currently to establish the business case of sustainability by making it financially unattractive to transfer negative externalities to the environment.

Recommendations drawn from findings

Concludingly, it can be said that sustainability champions and sustainability-driven organizations in the sector should be aware of their important role and bravely need to continue questioning the status quo and pushing long-term sustainable solutions forward. Startups in the sector should try to identify and work with sustainability champions surrounding their organization to increase the chances of establishing their innovations. At the same time, the government needs to take more action in disincentivizing the transfer of negative externalities to the environment. Furthermore, the innovation system needs to be made better fit for the real estate and construction sector by including all relevant actors and making support schemes more tailored to really address the valley of death in the sector – which is sufficiently verifying innovations fast enough so that they can translate into viable businesses and contribute to the sector’s sustainable development.

Zooming out beyond Sweden, this case study can even provide learnings for other countries and their real estate and construction sectors. Given the climate impact of the latter ones and the time pressure for societies to reduce their ecological footprints to avoid irreversible, undesired consequences for our SES, disruptive sustainability innovations in the sector are crucial. The combination of innovative startups, champions and committed organizations can work as a catalyst to facilitate the needed change fast enough and these actors should pursue working together to spur a sustainable development – independent of whether and how fast policy makers will take action.

Additional research is needed to dive deeper into the dynamics of sustainability innovations in real estate and construction for different types of startups and beyond this type of organization. Furthermore, extra research could be conducted regarding the dynamics of project platforms in this sector and how such can be utilized most optimally to encourage more systemic perspectives and accelerate the progress towards climate targets.
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Tabea Schroth
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Appendix 1: Interview Guide Companies

Introduction & Consent

- Introduce myself and thesis project
- Consent for data processing (verbal & audio-recorded)

Conversation Opener

- Can you tell me your name, your company, your position and how long you have worked in it?
- From your website and/or sustainability reports, I could see that you have the following sustainability initiatives […]. Can you briefly describe your reasons why you chose exactly these initiatives and how they are going?

Role in 2045 climate neutrality goal & sustainability in organization

- How would your company define sustainability?
- Sweden has the goal to become climate neutral by 2045 and the construction and real estate sector plays a critical role in reaching this target. How do you perceive the role of your company/organization in reaching this goal?
- What do you see as the main benefit of making sustainability part of your business?
  - e.g., potential monetary synergies, perceived societal responsibility, brand/image,…?
- Which role does environmental sustainability play in strategic, but also operational business decisions?
  - Can you give me a concrete example?

Perception of & work with sustainability innovations

- In order to learn about sustainability and sustainability innovations that are relevant for your company, who or where do you turn to?
  - e.g., trade fairs, tech incubators, specialized media, tech scouts, universities,…?
  - Which channel/medium do you consider the most relevant one? Why?
  - How do you engage these actors?
  - Do you actively search for them or expect to be approached?
- How do you assess and potentially exploit interesting innovations when you find them?
  - Which innovations will be considered?
  - Do you have a dedicated budget/program to explore and test innovations?
- Do you view innovation creation by startups in a different manner than established companies?
- If you are or have been collaborating with startups, do you view these types of engagements as more challenging, and why?
  - If risk aversity expressed towards startups: Do you think you might be missing out on opportunities by not taking more risks?
- How do you think innovative, sustainable products and services that you release as a result of your R&D/ suggest for projects [in case of consultants] /implement into your buildings [in case of real estate firms] are perceived by your tenants [real estate firms] / clients in the real estate and construction sector [others]?
  - Are the actors in this sector eager to implement such products into their projects? Why (not)? [only others]
  - Trends in the demand for such products/services? Why?
• Differences between customer groups?

Challenges to sustainability innovation

• Which challenges do you see in the development and implementation of sustainability innovations in the real estate and construction sector?
  o Concrete examples of challenges you are facing?
• Which conditions would need to be given to work with innovations more easily and confidently?
  o Who, in your opinion, is responsible for providing these conditions? Why?

Closing

• Do you have anything additional to share with me that you believe could help add with my thesis, based on our discussion?
Appendix 2: Interview Guide Governmental Agencies

Introduction & Consent

- Introduce myself and thesis project
- Consent for data processing (verbal & audio-recorded)

Conversation Opener

- Can you tell me your name, your company, your position and how long you have worked in it?

Role in 2045 climate neutrality goal & sustainability in organization

- How would your organization define sustainability?
- Sweden has the goal to become climate neutral by 2045 and the construction and real estate sector plays a critical role in reaching this target. How do you perceive the role of your organization in supporting the sector’s progress towards this goal?
  - How is your role distinguished from other actors in the innovation system?
  - Are there cooperations between different governmental actors working with similar innovations?
    - If yes, what do these cooperations look like?
    - If no, do you think opportunities are lost through this? Examples?
- To what degree are you free to can you influence the role you are assigned by the government?

Perception of & work with sustainability innovations

- In your role as a portfolio manager and business developer, what do you consider the most effective channels to learn about relevant innovations? [only Swedish Energy Agency] /Besides open calls published on your website, do you also employ other channels or methods to find potentially interesting innovations? [only Vinnova]
  - e.g., events in science parks or tech incubators, trade fairs, specialized media, tech scouts, universities…?
  - Which channel/medium do you consider the most relevant one? Why?
  - How do you engage these actors?
  - Do you actively search for them or expect to be approached?
- How do you assess and potentially support interesting innovations you come in contact with?
  - Which innovations are considered?
  - How do you concretely support the commercialization of the innovations?
- Do you view collaborating with startups as more challenging than collaborating with larger companies, and why?
  - What are the main differences?
- How would you describe the demand for innovation from companies in the real estate and construction sector (such as construction firms, technology firms, manufacturers etc.) towards your organization (compared with other sectors)?
  - Which trends do you see?

Challenges to sustainability innovation

- Which challenges do you see in the development and implementation of sustainability innovations in the real estate and construction sector?
  - Concrete examples of challenges you are facing?
• Which conditions would need to be given to work with innovations more easily and confidently and ideally “close the loop” between innovations in startups and their presence in the market?
  o Who, in your opinion, is responsible for providing these conditions? Why?

Closing

• Do you have anything additional to share with me that you believe could help add with my thesis, based on our discussion?
Appendix 3: Interview Guide Startup

Consent

- Consent for data processing (verbal & audio-recorded)

Perception of and work with the surrounding sustainability innovation ecosystem

- You previously identified "sustainability champions" in organizations as an entry point into potentially interesting organizations
  - Which channels do you use find and identify these “champions”? (e.g. fairs, LinkedIn, personal network, network of incubator,…)
  - Which channel do you consider the most effective and efficient so far?
  - How would you say this strategy of going through “champions” has worked so far?
- In a meeting in the very beginning of my thesis, we identified several groups of actors in the sustainability innovation ecosystem around your company.
  - Which groups do you consider most relevant to approach? Why?
  - Within these groups, based on what criteria do you choose whom you’d like to work with? (e.g., their business focus, previous projects you know about, their client base,…)
  - Which actor group has been the most receptive and which the most challenging to approach? Why?
- How have you perceived the role of the different parts of the innovation system you have worked with in your company’s journey so far (Incubator, Science Park,…)?
  - To what degree have they provided valuable support?
  - Did the support differ between actors?

Challenges to sustainability innovation

- In previous conversations, you have identified risk aversity of actors you approach towards new, not extensively tested technologies as a major challenge. Which conditions would need to be given to work with innovations more easily and confidently?
  - Who is responsible for providing these conditions? Why?
- Which further challenges do you perceive for startups like yours in developing and implementing sustainability innovations in the real estate and construction sector?

Closing

- Do you have anything additional to share with me that you believe could help add with my thesis, based on our discussion?