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Facilitating Innovation in an Ecosystem

An Exploratory Case Study

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Preface

This thesis is written as part of our Master of Science in Economics and Business Administration at the Norwegian School of Economics (NHH) with a specialization in Strategy and Management. The study is part of an ongoing research project at NHH and the Future-Oriented Corporate Solutions (FOCUS) program that explores how new types of organizational solutions can contribute to competitive advantages. The thesis is part of their project about Radical Technology-driven Change in Established Firms (RaCE), which further aims to develop research-based knowledge on how established and well-performing firms successfully may respond to and manage radical technology-driven change.

We wish to thank our supervisor Professor Christine B. Meyer for her valuable advice and feedback. Her support has been essential throughout the process of this study and we are very grateful for how helpful she has been.
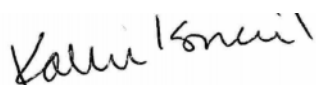
We also extend our gratitude to the informants, who took valuable time out of their busy schedules to participate in our study. Especially thanks to our key contact at Proptech Innovation for his collaboration and for introducing us to the rest of the participants.

Finally, we would like to thank the research foundation SNF, for providing us with office space and for all the cups of coffee.

We hope the thesis proves to be a captivating read and that it provides interesting insight into the exciting (and evolving) literature of ecosystems.

Bergen, December 2019

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Abstract

This study has examined the research question; *In what way can the establishment of an ecosystem facilitate innovation in the construction and real estate industry?* by conducting an exploratory case study of a recently established ecosystem. Eight informants from six firms have been interviewed, where half of the informants represent the company that initiated the ecosystem.

The current literature on ecosystems have been reviewed and applied to discuss the findings of this thesis. Supplementing the ecosystem research with knowledge on network resources allowed for additional understanding of the findings. The literature on ecosystems have seen increasing levels of interest in the past few years, and research on its dynamics and elements have resulted in varied approaches (Jacobides et al., 2018; Bogers et al., 2019).

The findings of this study reveal that the ecosystem was established as a result of pressure from macro forces, which are especially connected to new technological advances. The need for collaboration across firm and industry boundaries, flexible memberships, international ambitions and regional benefits in the form of competences on ecosystems, affected the choice of the ecosystem solution.

The ecosystem facilitates for innovation based on three main findings. The combination of arranging activities that are both flexible and more focused are important for the members ability to innovate within the ecosystem. The ecosystem allows for the possibility of sharing resources such as data, which provides large innovation opportunities. It provides advantages related to a holistic value chain approach and interdisciplinarity that can facilitate innovation on several parts of the value chain. In order to successfully facilitate for innovation as the ecosystem evolves, the findings revealed that focusing on communicating the larger goal of the ecosystem, changes to the leadership role and establishing trust between members will be crucial in the future.

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1. INTRODUCTION

Technology continues to demand considerable attention across all industries – as an enabler, a disruptor and a risk (KPMG, 2018). The real estate and construction industries have never been at the forefront of technological innovation, and property companies are increasingly criticized for being slow to accept and adapt to change. The emerging technologies may require established companies to rethink what markets they operate in, what problems they are solving and what parts they play in the value chain (KPMG, 2018).

This development has prompted the buzzword *Proptech*, a composition of the words property and technology. Similarly to the way Fintech entails the use of technology in finance, Proptech is about digital innovation in the property industry (University of Oxford Research, 2017). The term is used frequently when discussing the ongoing change in the industry and how companies need to embrace technology and innovation today to ensure that they are successful in the future. Proptech entails everything from buying and selling property and digitization projects in construction, to the use of AR, AI and big data (KPMG, 2018). The need to adopt these new technologies is imminent as the technological debt of firms is high and the potential for increased value creation is great within the industry. Incumbent firms are at risk of being disrupted by small start-ups, who are able to develop and make use of Proptech to gain competitive advantages while established firms struggle to advance the new abilities they need.

Thriving in the new and fast-moving competitive environment in turn depends on firms' ability to innovate successfully (Adner & Kapoor, 2010). While innovation is recognized as a key ability, the ways in which an organization can innovate are many and varied. In addition, firms must be able to continue to exploit existing markets while also exploring new markets (Tushman & O'Reilly, 1996). Collaborating with a supplier remains the most popular option for how incumbents in the industry expect to develop their digital and innovation capabilities (KPMG, 2018). The challenge arises when suppliers are unable to offer new technological solutions that incumbent firms needs or wants, and initiatives are needed in order to achieve strong, industry-spanning shifts in incumbent firms' environment.

The real estate and construction industry find itself in surroundings that are constantly more demanding to navigate, where new disruptors enter the market with new technologies or solutions (Furr & Shipilov, 2018). This is a result of incumbents being ill prepared to develop fundamentally new capabilities when faced with uncertainty and change (Adner, 2012). As the

world is becoming increasingly more complex and interdependent, companies are realizing how difficult it is to innovate by themselves. Individual innovations often reside within bigger systems and realizing an innovation's possibilities and consequences requires an understanding of its relationship to its external context (Adner & Kapoor, 2010). Consequently, it is essential that companies collaborate in new ways to thrive and successfully innovate in the current competitive environment (Adner, 2012; Furr & Shipilov, 2018).

Within the business and strategy literature, the notion of *ecosystems* has gained significant attention in the later years. Searching the term ecosystem in the title or abstract of the top strategy journals shows that the frequency has increased sevenfold over the last five years (Jacobides, Cennamo & Gawer, 2018). The concept of ecosystems is a new way to characterize how firms navigate their competitive environment and the ecosystem term generally refers to a group of interacting firms that depend on each other's activities to some degree (Jacobides et al., 2018). Additionally, ecosystems are becoming more and more recognized as crucial for the success of a firm's innovation strategy and business model (Shipilov & Gawer, 2018). Adner (2017, p. 40) defines ecosystems as "the alignment structure of a set of partners that need to interact in order for a focal value proposition to materialize''. His approach starts with a value proposition and seeks to identify the set of actors that need to interact in for the proposition to be realized (Adner, 2017).

This thesis examines how an incumbent firm initiated the establishment of an ecosystem in the real estate and construction industry, to assist with their innovative needs. The study's purpose is to gather insight on how an ecosystem can facilitate innovation in the real estate and construction industry. Within this context, the following research question will be addressed:

> *In what way can the establishment of an ecosystem facilitate innovation in the construction and real estate industry?*

The thesis starts off with a review of existing literature on ecosystems, its members and its relation to clusters and network theories. Then the case setting is introduced, including information about the real estate and construction industry and the studied ecosystem, to provide the reader with necessary context for the thesis. The following chapter describes the methodology including research design, the data collection process and information about the research objective and data analysis process. The last part of the chapter assesses the research quality and some ethical considerations. Next, the findings are presented, accompanied by direct quotes from the informants and a descriptive model. Finally, the results from the findings

are discussed and analyzed in relation to existing literature. We explain how our findings supports, contradicts and contributes to the literature. Before a summary of the most important contributions, limitations, suggestions for future research and practical implications are presented.

2. THEORY

In this chapter, existing literature on the concept of ecosystem is reviewed. The first section contains a presentation of different ecosystem definition and dynamics, followed by a presentation of the three different streams of ecosystem literature. Then the topic of ecosystem members and their roles are reviewed, followed by clarifications as to how ecosystem literature is similar and different from literature about networks. Finally, a section about the importance of network resources is presented.

2.1 Ecosystems

In the last few years, there has been an increase of interests on the topic of ecosystems as a new way to explain a firm's or market's competitive environment (Jacobides et al., 2018). The emergence of ecosystem research and its newfound link to business strategy and innovation is closely connected to uncertainty in the environment as a result of new technological advancements (Adner & Kapoor, 2010). The term ecosystem generally refers to a group of interacting firms that depend on each other's activities to some degree (Jacobides et al., 2018). One can say that organizations have always been part of ecosystems, but where the boundaries between firms and industries used to be clear, firms are experiencing large changes in how they interact with each other and their business environment. The interconnectedness between companies and industries means that all moves that companies make will, to varying degrees, affect its business surroundings, which in turn affects the company's performance (Iansiti & Levien, 2004).

At this date, more than 300 articles on ecosystems have been published by academic researchers, most of which have been published in the last five years (Bogers, Sims & West, 2019). Still, there is no clear and agreed upon definition or understanding of what an ecosystem is. It was Moore who first coined the term in 1993, by advising managers to view their competition with other firms by drawing an analogy to a biological ecosystem. The biological parallel is flawed because factors like sunlight and temperature will follow predictable cycles, while factors like technology in business ecosystems will be in a constant state of change (Iansiti & Levien, 2004). However, Moore (1993, p. 76) also suggested that "a company be viewed not as a member of a single industry but as part of a business ecosystem that crosses a variety of industries". He goes on to suggest that "in an ecosystem, companies coevolve

capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations" (Moore, 1993, p. 76). It has been a long time since Moore's original article on ecosystems was published, yet no consensus has developed in the literature on how to approach ecosystems, or what the elements and dynamics are.

In recent years, several researchers have attempted to define ecosystems and their elements (Adner, 2017; Bogers et al., 2019; Jacobides et al., 2018). Bogers et al. (2019) has proposed a new, broad definition of an ecosystem as "an interdependent network of self-interested actors jointly creating value". This definition, the researchers add, comprises of four components – interdependence, network, self-interested actors and joint value creation. Three of the components are operational constructs that links to the central goal of joint value creation: "the goals of the ecosystem members, their interdependence and the attributes of the network" (Bogers et al., 2019, p. 11). The value creation for an ecosystem depends on the contributions of self-interested actors. Thus, success requires understanding the motivation of the members who join the ecosystem. Generally, the most commonly described success criterion for an ecosystem is whether it creates value in a way that no single actor would be able to do on their own (Bogers et al., 2019). While the members of an ecosystem usually will work to advance the success of the overall ecosystem, it is common that their self-interest is a higher priority (Bogers et al., 2019).

On one side, it is of every member's best interest that the ecosystem succeeds. On the other side, the nature of the relationships between the actors, particularly whether their respective goals are competing or complementary of each other, will influence how well they work together to achieve success (Bogers et al., 2019). In their research article, Bogers et al. (2019) considers three different types of interdependence that influence the relationship between the actors. First, cooperative interdependencies. In some ecosystems, the value creation is mostly complementary and the main interaction between the members is cooperative. This interaction is most likely when the firms are unrelated, especially when they do not compete for the same income (Bogers et al., 2019). Sometimes the members also have pre-existing relationships that are complementary, such as customer and supplier, prior to the establishment of the ecosystem. The complementary cooperation allows for outcomes and success that is positive for everyone (Bogers et al., 2019).

Secondly, the researchers discuss competitive interdependence. This suggests that the entry of new firms into an ecosystem may reduce the resources available to firms already in the ecosystem (Bogers et al., 2019). Additionally, that not only is there sometimes competition between firms, but it might also be between specific firms that participate in an ecosystem (Bogers et al., 2019). Literature suggests that tighter control by the leaders will deter competing firms from joining the ecosystem in order to minimize the aspect of competition (West, 2003). Finally, the researchers discuss the cooperative interdependence. Ecosystems require close cooperation for the actors to jointly create value in a way they would not be able to alone (Bogers et al., 2019). At the same time, in some ecosystems the value creation is dependent on the participation of direct competitors, thus ecosystem management requires both close cooperation and competition between ecosystem participants (Kapoor & Lee, 2013).

A different approach to ecosystems and its dynamics is presented by Jacobides et al. (2018). Their research proposes a narrower definition of an ecosystem as "interacting organizations, enabled by modularity, not hierarchically managed, bound together by the non redeployability of their collective investment elsewhere" (Jacobides et al., 2018, p. 2255). An important characteristic of ecosystems is that they help coordinate organizations who on their own have significant autonomy and researchers argue that this coordination is enabled by a modular architecture (Jacobides et al., 2018; Baldwin & Clark, 2000). Modularity allows interdependent components of a system to be created by different producers but within overarching parameters that lets different modules to interconnect with each other and the presence of modularity is critical for an ecosystem to emerge (Jacobides et al., 2018).The modularity allows for coordination between interdependent firms through ecosystems, with limited coordination required (Jacobides et al., 2018).

This alone is not enough according to Baldwin (2007) and Langlois (2003) who argues that modularity is more likely to lead to the emergence of markets rather than ecosystems. In turn, Jacobides et al. (2018, p. 2260) suggest that "for ecosystems to be useful, there must exist a significant need for coordination that cannot be dealt with in markets, but which also does not require the fiat and authority structure of a central actor". However, ecosystems do not emerge spontaneously. They are at least, in part, the result of deliberate experimentation and engineering from different parties (Jacobides et al., 2018). There are big differences between the governance and structure of ecosystems. Some ecosystems accept any participant who agrees to a minimal set of rules, while in other ecosystems memberships are strictly controlled, either by a committee or by the leader (Jacobides et al., 2018).

Finally, we highlight Adner's (2017, p. 40) definition of an ecosystem as "the alignment structure of a set of partners that need to interact in order for a focal value proposition to materialize". This definition locates the value proposition as the basis for the ecosystem. It is the proposed value proposition that creates the boundaries of the relevant ecosystem (Adner, 2017). This perspective is called ecosystem-as-structure and is part of the innovation ecosystem literature stream (Adner, 2017). The approach places the value proposition at the center of the ecosystem and then identifies the set of actors that need to interact to realize the value proposition (Adner, 2017). It further implies that members of an ecosystem have defined positions and activity flows among them (Adner, 2017). Alignment is the extent to which there is mutual agreement between the members regarding these positions and flows considering the fact that actors may have different interests and goals in mind (Adner, 2017).

Adner (2017) also suggests another perspective, the ecosystem-as-affiliation approach, which places emphasis on breaking down traditional industry boundaries, the rise of interdependence between firms, and the potential for symbiotic relationships in productive ecosystems. This is a perspective that focuses on questions of access and openness and it highlights measures such as number of partners, network density, and actors' centrality in the network (Adner, 2017). Strategy in the ecosystem-as-affiliation concept tends to focus on increasing the number of actors that link to a focal actor or platform, expanding its centrality and expected power (Adner, 2017).

Last, the term cluster and what it contains is seen in relation to the ecosystem literature. The term ecosystem is not delimited from the term clusters, but rather the ecosystem approach is a new and more expansive concept to examine innovation and competitive advantages through the interconnectedness between firms (Shipilov & Gawer, 2018). The literature on clusters is substantial and more established than literature on ecosystems. Porter's (2000, p. 16) framework on cluster has been widely adopted and he defines clusters as "a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities". Typical cluster solutions are often industry specific and if actors from multiple industries are present, they do not conduct joint value creation for a specific class of customers (Bogers et al., 2019). While the idea of ecosystems is rather to combine resources and coordinate interdependent companies from different industries to realize new value propositions for customers (Adner, 2017). Ecosystems further

differentiates from clusters as they are not geographically limited but are often open to international links (Bogers et al., 2019).

In this study, the ecosystem approach will be applied. This does not mean that the existing literature on clusters is ignored, but rather that this research moves beyond the limitations it represents. The newer understandings of ecosystems as presented by Jacobides et al. (2018), Bogers et al. (2019) and Adner (2017) are the starting point for this thesis.

2.2 The three streams of ecosystem literature

When reviewing the existing literature on ecosystems, three different streams can be identified: a business ecosystem stream, a platform ecosystem stream and finally an innovation ecosystem stream (Jacobides et al., 2018). There have been other attempts at sorting the ecosystem literature, but the method of three streams is recognized widely by researchers.

When referring to a business ecosystem, the literature views the ecosystem as a "community of organizations, institutions, and individuals that impact the enterprise and the enterprises' customers and suppliers" (Teece, 2007, p. 1325). This is an understanding of ecosystems as economic communities, where the company must monitor and react to other members in their business environment (Jacobides et al., 2018). The business ecosystems consist of participants who are loosely interconnected and interdependent of each other for mutual effectiveness and survival (Iansiti & Levien, 2004). Thus, stressing that the members have a shared fate and that they are susceptible to negative consequences from actions and moves made by other actors in the ecosystem (Iansiti & Levien, 2004). This is the stream with the broadest understanding of what an ecosystem is. It lays little to no boundaries for structure, size, or objective. The view is so expansive that defining the scope of the ecosystem becomes almost impossible (Shipilov & Gawer, 2018).

The next stream of literature is about platform ecosystems. In this stream, the literature suggests that it is the digital platform that is focal to the ecosystem (Bogers et al., 2019). Platforms in ecosystems are the core technology where complementors can connect their products and services (Shipilov & Gawer, 2018). Instead of focusing on how and why innovations succeed, research on platform ecosystem aims the attention toward the technological solution. These types of ecosystems can be seen in many of today's large technology firms such as Apple with their iOS operating system (Shipilov & Gawer, 2018).

The interdependencies in this view is between the provider of the platform and its complementors, where the latter is simply connected to the central technology (Shipilov & Gawer, 2018). The relationships between the member firms are of less interest, because the ecosystem is viewed as a "semi-regulated marketplace" that is fostered by the platform leader (Jacobides et al., 2018).

Finally, in the stream of literature about innovation ecosystems, the ecosystem is viewed as "the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution" (Adner, 2006, p. 98). The firms have customer solutions as the main focus when choosing to collaborate in an ecosystem. In an innovation ecosystem, one could say that the organizations provide the components and complements to the main product or service in a coherent value proposition (Shipilov & Gawer, 2019). This is a more restricted view of ecosystems. It acknowledges the interdependencies between firms in the same way as business ecosystems, but it also connects the purpose of the ecosystem to specific offers or value propositions (Jacobides et al., 2018). It further differentiates from other streams because the members are not those who usually would collaborate, but those who need to align and link up for new value propositions to be realized. The innovation ecosystem literature also highlights that the focus on the value proposition requires an ecosystem analysis to consider the extent to which there may be "divergence of interests across members" (Adner, 2017, p. 43).

The members of an innovation ecosystem span across industries and contains all organization that needs to align to provide components and resources for innovative projects. The emphasis is on understanding how members interact in their efforts to create and commercialize new innovations, and it further implies that if the coordination fails, then so does the innovation (e.g., Adner, 2012; Adner & Kapoor, 2010; Kapoor & Lee, 2013).

2.3 The ecosystem members and their roles

As with the other aspects of the literature on ecosystems, there are multiple understandings regarding the roles of the firms within ecosystems. Dedehayir, Mäkinen & Ortt (2018) defines an ecosystem role as "a characteristic set of behaviors and activities undertaken by ecosystem actors". Most research agrees that there is one or multiple organizations that play a leading and central role in both the ecosystems' emergence and its stability, these organizations have been

labelled leaders, hubs and sponsors in the literature (Bogers et al, 2019; Dhanaraj & Parkhe, 2006; Cusumano & Gawer, 2002).

In their literature review, Dedehayir et al. (2018) suggest that four main activities are undertaken by the leaders: governance, forging of partnerships, platform management and value management. Other researchers suggest that the leaders mostly engage in initiatives aimed at legitimizing them as generous actors that cares not only for their own self-interest, but about the growth and collective success of its ecosystem members (Gawer & Philips, 2013). Whether leaders succeeds in their role depends on multiple factors, such as their approach to aligning the interests of different players in the ecosystem, how they manage their own commitment to the ecosystem and their understanding of the unique characteristics of the ecosystem itself (Gawer & Henderson, 2007; Iansiti & Zhu, 2012; West & Wood, 2013). The ecosystems survival and growth are dependent on the leaders' capability to manage multiple ecosystem members with different priorities. At the same time, they are in the unique position to both support and benefit from the ecosystem success (Bogers et al, 2019).

There is less literature on the other members of the ecosystem. Adner (2017, p. 47) suggest that in ecosystems there are simply leaders and followers, where the follower's role is to "act in accordance to the plan set by the leader". Iansiti & Levien (2004) argues that there is a keystone actor that provides assets for the other members use; dominators who control major parts of the ecosystem and its value; and finally, niche players that have or develop specialized capabilities that differentiate them from the other members in the ecosystem. Dedehayir et al. (2018) presents three actors in addition to the leader role that members in the ecosystem can take. The direct value creator, such as suppliers and complementors that are directly associated with the value creation processes in the ecosystem. Then the researchers propose the presence of value creator supporters, whose role is to provide supporting elements that facilitates value creation activities of the other members. Finally, the entrepreneurs and regulators who in different ways encourage the creation of an ecosystem and its continued development (Dedehayir et al., 2018). As most research concentrates on the role of the leader, the understanding of other members roles appears to be limited. However, research has shown that the roles of both the leader and the other members change during different phases of ecosystems development (Bogers et al., 2019).

2.4 Connecting to network theory

Networks and ecosystems represent two different approaches to how organizations can manage their dependence on the external environment (Shipilov & Gawer, 2018). The perspectives are similar because they both examine how firms can improve their performance by interacting with other organizations, but the research on networks represents a more mature perspective than that on ecosystems (Shipilov & Gawer, 2018). Researchers suggest that an ecosystem connects its interdependent actors through a network that can be defined as the structure of relationships between the ecosystem members (Adner, 2017; Iansiti & Levien, 2004; Jacobides et al., 2018).

The perspectives differ from each other, as the literature on networks focuses on existing ties between actors and it does not consider the overarching purpose for the relationships that are central to ecosystems (Shipilov & Gawer, 2018). Research on ecosystems and networks highlight different ways in which organizations discover and manage interdependencies amongst each other. In networks theory, one is interested in understanding how organizational interdependencies are managed within formal relationships while at the same time assuming that the social structure in an industry is given (Shipilov & Gawer, 2018). The unit of analysis in ecosystems research however, is either the ecosystem as a whole or the focal offering that is provided by the ecosystem (Shipilov & Gawer, 2018).

Because of the differences in perspectives, ecosystems cannot be reduced to a set of inter-organizational alliances or to a network of organizations (Shipilov & Gawer, 2018). However, the connection between the two theoretical perspectives are complementary to each other and increase the insight on the role of networks in ecosystems. The network literature has provided powerful findings that are relevant to the understanding of ecosystems. For instance, networks are beneficial for firms because they gain access to different resources and can take advantage of enabled trust, exchange of information and joint problem solving (Uzzi, 1997). However, network relationships might be disadvantageous if firms are stuck in relationships that are no longer beneficial or valuable (Shipilov & Gawer, 2018).

2.4.1 Networks and the exchange of resources

This study seeks to supplement the more recent ecosystem research in an attempt to identify why they emerge and why they are suited (or unsuited) for interorganizational innovation. The

understanding of ecosystem dynamics can be supported by the inclusion of the role of networks, and more specifically the role of network resources, as presented by Lavie (2006) in his extension to the resource-based view (RBV).

In recent years, the RBV has become one of the most recognized frameworks in strategic management literature (Lavie, 2006). Generally, the RBV proposes that any firm possess a set of resources that can produce a positive, neutral, or negative impact on its overall competitive advantage (Lavie, 2006). In the traditional perspective on the RBV, Barney (1991, p. 102) broadly defines resources as "all types of assets, organizational processes, knowledge, capabilities, and other potential sources of competitive advantage that are owned or controlled by the focal firm". The competitive advantage of the firm can then be measured by how rare and valuable their resources are (Lavie, 2006).

According to Lavie (2006), the traditional RBV fails to question the competitive advantages that can be gained from network environments. This is because it does not to consider how firms can acquire competitive advantages from an environment where companies collaborate with their network partners (Lavie, 2006). The notion of *network resources* was introduced by Gulati (1999), who examined how resources that are present in the firm's environment will shape the formation of alliances. Gulati (1998, p. 300) defines an alliance as "a voluntary arrangement among firms that exchange or share resources". Network resources are "external resources embedded in the firm's alliances that provide strategic opportunities and affect firm behavior and value" (Lavie, 2006, p. 638). For a number of years, evidence has suggested that network resources, that are shared via firm interactions, has a considerable impact on the firm's performance. Moreover, this suggests that partners resources influence the competitive advantage of other firms in their network (Lavie, 2006).

Consequently, the fundamental assumption of the RBV, where firms must own or fully control the resources for them to provide competitive advantage turns out to be limiting. Instead, Lavie (2006) proposes that access to the resources of partners, which establishes the right to use and enjoy their associated benefits, can affect the competitive advantage of a firm. With this perspective, ownership of resources is no longer a necessary condition for a competitive advantage.

The contribution from Lavie (2006) suggest that when an alliance is formed, each participating firm contributes a part of its resources to the network, with the expectation of generating

common benefits from the shared resources of all firms. Therefore, each firm in the network has access to a set of shared resources in addition to a set of nonshared resources that together form the firms complete set of available resources (Lavie, 2006). The contributions of this study are robust enough to apply to alliances of different types, according to the researcher (Lavie, 2006). Consequently, knowledge from this study can be applied to ecosystems in which partners pool some of their resources together to enhance their competitive positions (Lavie, 2006).

3. INTRODUCTION OF THE CASE

In this chapter the context will be introduced with a presentation of the case and industry studied in this thesis. In the real estate and construction industries, innovation initiatives related to digitalization and technology has been lacking (McKinsey & Company, 2015). The ecosystem *Proptech Innovation* is established in order to encourage changes and innovations.

3.1 The construction and real estate industry

The real estate and construction industry consist of the physical buildings and supporting infrastructure that people live and work in. In the McKinsey Industry Digitization Index, sectors across the economy is examined through the lens of digital assets, digital usage, and digital workers, capturing the many possible ways in which companies are making technological advancements (McKinsey & Company, 2015). The report shows that the construction and real estate industries are lagging and implies that the potential for innovation in the industry is large. If a modernization is successful, the industry can use digital tools to raise the bar in operational efficiency, customer engagement, innovation, and workforce productivity (McKinsey & Company, 2015).

In 2018, KPMG conducted a survey of 270 real estate decision makers from 30 countries to understand the global real estate sector's latest attitudes towards Proptech and the steps that organizations are taking in order to adapt to new digital advancements (KPMG, 2018). Findings show that most actors are aware of the potential opportunities and challenges that Proptech poses, but that the level of action taken in the industry is low (KPMG, 2018). The writers of the report states that the real estate industry is trying to catch up with other industries. They also point to the fact that many companies in these industries have failed in the past because they were too slow to react to potentially life-threatening disruptors (KPMG, 2018). KPMG advise the real estate industry to act now in order to avoid the same fate. Finally, the report points to the fact that decision makers must consider their entire ecosystem and places significant emphasis on collaboration with start-up companies (KPMG, 2018).

3.2 Proptech Innovation

The case for this thesis is Proptech Innovation, which from now on will also be referred to as *the ecosystem*. The ecosystem has formed their own definition of the term Proptech (Internal document 1):

> *Proptech is technology that facilitates radical or gradual changes in the way we buy, sell, design, build and manage residential and commercial property.*

The ecosystem was founded about a year ago. It has over 60 companies as members, ranging from industries such as real estate and construction, to consulting firms and technology driven start-ups. Proptech Innovation's vision is to be a leading environment for innovation and new ideas within city planning, building communities and smart solutions within property (Internal document 1). The purpose of the ecosystem is to strengthen the development of Norwegian property technology and to actively work for increased collaboration, development of knowledge, innovation, value creation, growth and internationalization (Internal document 2). The chairman's hope for the initiative is that it will lead to supply, and demand being broken down and put together in new ways, rebuilding and streamlining value chains, and business models changing while new ones emerge (Internal document 2). The focal value proposition of the ecosystem is the building or home and almost every member is related to that value proposition. For example, the ecosystem consists of several power companies even though one might not say that these types of companies are part of the construction and real estate industry. They are, however, part of the ecosystem around a building or a house. Other companies have a strictly supportive function in Proptech Innovation like consulting and law firms.

The ecosystem established two workgroups after an early workshop event that was hosted by one of the consulting firms. The members of the groups work together on long-term innovation projects. One of the workgroups is studied in this thesis and will henceforth be referred to as "Sharing is Caring".

For the purposes of this thesis the ecosystem Proptech Innovation is not anonymized. However, the informants and the established firms involved in the project have been anonymized in order to protect the informants. The relevant companies and names will only be referred to with pseudonyms.

The initiator of the ecosystem and case company in this thesis is a well-established property and real estate developer in Norway. From this point on, the company will be referred to with the pseudonym RED (Real Estate Developer). In addition to building houses, they also manage and operate commercial and private properties. The company has hundreds of employees and a long history in one of Norway's biggest cities: Bergen. The senior managers in RED took the initiative to establish the ecosystem and is a member of the ecosystem on equal terms as the other firms but has had an especially prominent role when it comes to the establishment and early operation of Proptech Innovation.

A goal for the ecosystem is to achieve "cluster status" through Innovation Norway's cluster program (Innovasjon Norge, 2019). By being enrolled in the cluster program, they can access consulting services, promotion services and most importantly, funding (Innovasjon Norge, 2019). This is the reason why Proptech Innovation has established themselves as a business cluster although they refer to themselves as an ecosystem. The informants sometimes mix the terms cluster and ecosystem when talking about Proptech Innovation. However, as this study seeks to apply and contribute to the ecosystem literature, the approach and terminology will be applied throughout.

By conducting interviews with informants from Proptech Innovation, the aim of this thesis is to gather insight on why the ecosystem was established, why the solution was chosen to facilitate innovation in the industry and the advantages and challenges of innovating in an ecosystem.

4. METHODOLOGY

In the following chapter the methodology applied to answer the research question is presented in detail. First, by an explanation of the research design, approach and strategy, followed by details about data collection and sources, before information about the interviews, analysis and coding process is described. The final part of the chapter discusses the quality of the research and ethical considerations for the project.

4.1 Research design

The research design is the general plan for how the research question will be answered and has implications for the research process in terms of its approach, strategy and data collection (Saunders, Lewis & Thornhill, 2016). The aim of the research is to understand *how the establishment of an ecosystem can facilitate innovation in the property and real estate industry*, and since this is a subject with limited previous research, the thesis is based on an exploratory design. The exploratory design is particularly useful when the intent is to clarify the understanding of an issue, problem or phenomenon (Saunders et al., 2016). An exploratory design and the flexibility it entails was crucial for this research process as the results was uncertain in the beginning.

Because we wanted to explore how an ecosystem can facilitate innovation, the research method applied is a case study. A case study is a "research method, generally used to investigate a contemporary phenomenon in depth and in its real-world context" (Yin, 2018, p. 286). The case is both the ecosystem Proptech Innovation and RED.

The research question is open-ended and unsuited to be answered by numerical data. In addition, the research question is complex and implies the need for flexibility during the research process. The research is therefore based on a qualitative research method (Saunders et al., 2016). In this thesis the research aims to study innovation in an ecosystem, using a variety of data collection techniques and analytical procedures, to provide theoretical contributions (Saunders et al., 2016).

4.1.1 Research approach

In this thesis, an abductive approach has been applied to the research. The definition of abduction is the process of gaining insights to create new conceptual possibilities which are then examined (Charmaz, 2011; Saunders et al., 2016). Abduction is a combination of deduction and induction. A deductive approach is based on a research strategy where the intention is to test a theory based on the data collection (Saunders et al., 2016). An inductive approach is when the research is initiated by collecting data to explore a phenomenon and in turn generate or build theory (Saunders et al., 2016). This thesis is written in conjunction with the FOCUS research program at NHH that explores how established and well-performing firms successfully may respond to and manage radical technology-driven change. The research was directed towards ecosystems by our supervisor who is a professor affiliated with the FOCUS-program. This decided the context for the project in a deductive manner. The research question is explorative in its nature and can thus be approached with a combination of inductive and deductive methods. The goal of the data collection was to explore a case where a new ecosystem is established in order to develop further insight on the ecosystem literature. The findings will be explored in relation to already existing theories about ecosystems (Saunders et al., 2016).

Research with an inductive approach is likely to be particularly concerned with the context in which the events take place (Saunders et al., 2016). Therefore, a study of a small sample of subjects is more appropriate than a large number as with the deductive approach (Saunders et al., 2016). According to Saunders et al. (2016), it is typical for the abductive approach to begin with an interesting or surprising fact, and then to build a theory as to why the phenomenon occurred. This study is distinctive because an ecosystem of organizations is approaching innovation in a way they have never done before. The initiators established an ecosystem, which has led to over 60 companies collaborating on innovation in a new way. The companies want to collaborate when they can and compete when they must and the way they are trying to accomplish this is not only new to the actors involved but has implications for changes and new innovative possibilities in multiple industries. This is happening in the real estate and construction industry where there has been a lack of innovation and technology initiatives which makes the case especially fascinating to explore. It represents an example that is informative and interesting due to this special context. The inductive and exploratory approach of the study has allowed it to be driven by the case and the data collected, while the combination

with a deductive approach also guides the direction by allowing existing literature to support the findings.

4.1.2 Research objective and strategy

The research identifies themes and patterns to further develop the field of ecosystems with new understanding of how it facilitates innovation for its players. This is done by studying an ecosystem solution that has been initiated by RED. The goal of the research is to contribute to the evolving ecosystem literature by combining existing theory with our collected data.

To answer the research question, data was collected through semi-structured interviews with key players, internal organizational documents, publicly available information online and by attending events arranged by Proptech Innovation. This strategy is a qualitative approach that allows for an exploratory research design where the findings are found inductively from the data that has been collected (Saunders et al. 2016).

Proptech Innovation became the case organization for this thesis through getting in contact with the consultant firm that is hired by RED to lead the ecosystem today. We approached the consultant firm because they had held an event where the theme was ecosystems. This led us to Proptech Innovation and our key informant in RED. The key informant works with business development in RED and was one of the main initiators of Proptech Innovation.

4.2 Data collection

We collected all the primary data ourselves, while our key informant provided us with most of the secondary data. Our key informant also assisted us in selecting the other informants from RED and Proptech Innovation and provided us with their contact information. This was an important factor for our data collection and was very helpful considering the limited time available for this study. In the following section, a more detailed description of the data, how it was gathered and handled, and our sample will be presented.

4.2.1 Sample

The process of choosing the sample for this study began after getting in contact with our key informant. We attended an open event that was hosted by RED, where the ecosystem was presented. This meeting was important for the direction of this study. The key informant then

helped us choose and get in contact with the participants in a purposeful manner based on their relevance to the research. At this point it was decided to interview participants from RED and from the workgroup Sharing is Caring because it was the most relevant for our research. An additional informant was also recommended during an interview even though he is no longer part of the ecosystem, because he was part of the group who initiated Proptech Innovation. We went back and forth between analyzing the data and collecting more data as our categories and theories developed, this technique is known as theoretical sampling (Charmaz, 2006). Comparing already collected data with new data gave us an indication of what new information we needed to gather for furthering the data collection and analyzing process (Saunders et al., 2016). Interviews continued until we felt that the properties of the categories were saturated and that they reflected the experiences of our informants. In this context, saturation indicates that gathering more data does not reveal new theoretical insight or new properties of the categories (Charmaz, 2006).

Our informants are divided into two groups. The first consists of participants from RED and one external consultant who all have had or currently have important roles in Proptech Innovation. All of them are heavily involved in the ecosystem and have experience either in senior management positions or have specialized in business development and ecosystems. The key informant is part of this group.

The members of the second group were selected because they, except for one, are part of the workgroup Sharing is Caring. The group consists of selected members from different companies, industries and who have different competences. The members of Sharing is Caring is currently working on a project that is aimed towards technical advancements, sharing and innovation. The group is currently working on a specific project that is anonymized for the purposes of this thesis. It is an especially interesting group to study because the success of their project is viewed by the other members as imminent for the success of the ecosystem. It is a relatively new group of actors who have been working together for approximately 8 months, and the dynamics of their collaboration is still developing. The combination of being one of the first specific projects of the ecosystem and its direct focus on innovation through sharing resources, data and technological advancements made the workgroup particularly interesting and relevant for us to study. Additionally, the fact that they all know each other and have attended many of the same events hosted by the ecosystem was interesting because it provided both confirmation of stories and events, but also highlighted the contrasts in different

experiences and understandings. There are informants from a total of six companies represented in this study.

Informant 7 is the only participant in the second group that is not part of Sharing is Caring. This was not initially the plan, as it first became apparent during the interview that this informant was not a part of the workgroup. However, the informant had been actively involved in the startup process of the ecosystem and the interview provided important information about establishment and early stages of the ecosystem. The insights were different in that they were restricted to this phase of the ecosystem, but the informant still had interesting and relevant reflections.

Table 1: Overview of the informants

RED representatives and ecosystem leaders	Description of informant	Representatives from other companies	Description of informant
Informant 1	Key informant and business developer at RED	Informant 5	Municipality representative
Informant 2	Former senior manager at RED	Informant 6	Waste management firm representative
Informant 3	Consultant that specializes in ecosystem management	Informant 7	Energy firm representative
Informant 4	Senior manager at RED	Informant 8	Technology firm representative

4.2.2 Data Sources

The primary data was collected through 8 semi structured interviews with informants from the ecosystem and RED. Primary data in the form of observations were also made during a breakfast meeting hosted by RED for the public and at the Proptech Innovation Conference 2019. By observations we refer to the act of viewing, analyzing and interpreting people's behavior (Saunders et al., 2016). Additionally, memos and other written notes were created throughout the research process. The secondary data consists of information from public company websites and files provided by the key informant in RED.

Semi-structured interviews

The problem statement is formulated in a way that requires flexibility during the data collection, hence the main form of data collection was conducted with semi-structured interviews. The data has been collected using semi-structured interviews with one informant at a time, and each interview lasted approximately one hour. To be able to compare, draw conclusions and see patterns in the data, the main themes and key aspects were covered in all of the interviews (Saunders et al. 2019). So, while flexibility was important, the interviews demand a certain level of structure. Considering the exploratory design of the research project, this type of data collection is fitting as it provides the opportunity to give a broader picture and well-informed context to the case (Saunders et al. 2016).

All the informants were first contacted by email in order to arrange a meeting, except for our key informant. A follow-up mail was sent out the day before the meeting where the participants were informed of the themes for the interview. Every interview was conducted face-to-face with the participants. The interviews were held in a meeting room of the office at the respective informant, except for one that was held at NHH. This was time consuming considering that our informants worked in different firms all over the city. However, this was also favorable because it gave us the opportunity to build trust and to start with some small talk before beginning the interview. Conducting the interviews in surroundings that the informants are comfortable in contributed to them feeling more relaxed and secure when answering the questions.

Interview guide

The interview guide is developed inductively (Saunders et al., 2016). First, we structured the guide by listing up themes we wanted to explore based on knowledge from existing literature, meetings with our key informant and in discussion with our supervisor. The questions were then generated from the themes with an early draft of the research question in mind. In addition, the guide also contains questions derived from common sense and from experiences during the research period (Saunders et al., 2016). The questions are open-ended to encourage the informants to talk and reflect as freely as possible. In alignment with recommendations from Ghauri and Grønhaug (2010), the interview guide was reviewed by our supervisor before conducting the interviews.

One main guide was initially created, before modifications were made for the two sample groups. One interview guide was directed at the informants from RED and the other interview

guide for informants within Sharing is Caring. For instance, the informants from RED was asked why they decided to initiate the ecosystem while the representatives from the other companies were asked why they decided to join the ecosystem. After the initial interviews had been held, additional questions were added to the guide to reflect new information we wanted to explore further.

Before starting the interview, the informants were asked to sign a consent form that contained information about the research project, information regarding confidentiality and their right to withdraw from the research project at any time without providing a reason. The form was developed from a standard consent form created by the FOCUS program at NHH. In each interview one person primarily asked the questions while the other took notes and asked follow-up questions if needed. Our intention during the interviews was for the informants to talk as freely as possible about their experiences and reflections while still uncovering as much relevant information as possible.

Secondary data

Secondary data include text, audio and visual media and can be useful by giving additional meaning to the primary data (Ghauri & Grønhaug, 2010; Saunders et al., 2016). Sources of secondary data in this thesis include the webpages of the organizations and documents that have been shared with us by our key informant. The contents of the internal documents are described in the table below.

Table 2: Description of documents

Internal documents	Description of content
Internal document 1	Presentation slides with information about the idea, vision, definitions, and previously held arrangements.
Internal document 2	General information to new members about Proptech Innovation and the real estate and construction industry.
Internal document 3	The contract that new members sign to join Proptech Innovation. Includes regulations and information about different membership levels.

The information from the secondary data was helpful during the development of the interview guide. The analysis is mainly based on the interviews with the informants, yet everything we learned through secondary data is still of importance for this study. The secondary data about how the ecosystem was established and a slide deck including the vision of the ecosystem has

been important for us to form a complete picture of the current situation. It also guided us considerably when deciding on how to ask the informants about the context and what led to the establishment of the ecosystem.

4.3 Data analysis

In the following part, the process of preparing, coding and analyzing the data is described. The interviews were transcribed, and quotes were translated to English as part of the data preparation. The coding method applied in this study is template analysis. Existing literature was used as a complementary source to inform the project on general terms but was not applied as a source to create categories. The results of the coding process are presented in the findings chapter.

4.3.1 Data Preparation

The first step in preparing the primary data for analysis was to transcribe the audio recordings of the interviews. This was a time-consuming process where we wrote down exactly what the informants said, while also paying attention to the way they responded. Notes where added for when the informants took pauses to think, when they laughed or in the case of other happenings. In accordance to Saunders et al. (2016), who argues that it is essential to add contextual information to ensure that important incidents that affect the conduct of the interviews or observation is not missed. Every interview was saved as a separate word-file with a name that preserved the informant's anonymity.

Because the interviews were conducted in Norwegian, all of the coded quotes had to be translated to English. This was challenging especially because certain words and phrases in Norwegian lose or change its meaning when translated into English. However, we did our utmost to make sure the translations were as accurate as possible. The secondary data was also translated from Norwegian to English to the extent it was necessary. It is in our opinion that we can handle both the Norwegian and English language well.

4.3.2 Template analysis and coding

Template Analysis has been applied for the analysis of the data. In Template Analysis, only a proportion of the data items are coded before developing an initial coding structure and

interpretive themes (Saunders et al., 2016). This is known as a coding template and is a hierarchical representation of themes and codes that includes a hierarchy of higher order themes, subthemes and lower order thematic codes (Saunders et al., 2016). The initial coding structure was developed by coding the first interviews, which in turn also gave some guidance in the later interviews. As an example, the second higher order theme in our coding template was first labeled "Innovation" before later being named "Ecosystem for innovation" and gaining suborder themes. A few more codes were added, while others were moved to a different, higher order theme.

Illustration 1: Development of coding template

2 Innovation
    2.1 Holistic perspective
    2.2 Value chain
    2.3 Sharing data
    2.4 Sustainability

2 Ecosystem for innovation
    2.1 Advantages
        2.1.1 Value Chain
        2.1.2 Sustainability
        2.1.3 Interdisciplinary value creation
        2.1.4 Access to data
        2.1.5 Sharing
    2.2 Activities

The process of modifying the coding template continued until a satisfactory template was developed after all interviews had been transcribed. Before starting the coding process, the transcribed interviews were read carefully. Since the research approach is a combination of inductive and deductive, some of the transcribed interviews were coded and then these were seen in relation to the research question and the prior theoretical framework gathered for the thesis (Saunders et al., 2016). The codes were derived from a combination of two sources: one was labels that we developed based on what we thought best described a unit of data, and the other were derived from terms used in existing theory and literature (Saunders et al., 2016). The coding template was modified several times as more interviews were conducted and transcribed. This is an exploratory process involving the arrangement and rearrangement of codes until they are devised into themes that appear to represent key ideas and relationships in the data (Saunders et al., 2016).

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The final coding was done in the qualitative analysis tool Atlas.ti Cloud. To make sure that nothing was missed or misinterpreted we separately coded the interviews manually first, based on the final coding template. We then compared our work and decided on a final coding of the data that was applied in Atlas.ti Cloud. Using this tool was helpful since it allowed us to work simultaneously with the transcribed interviews. It sped up the progress of marking quotes and sorting them into their respective categories. In addition, the tool collects and presents all the data with the same codes in easy formats, which saved us time.

4.4 Research quality

In this section the quality of the research design and findings are addressed. Fundamental quality concerns for quantitative studies are based upon reliability, validity, generalizability and objectivity. When conducting qualitative research however, it is argued that these determinants are not suitable to the designs and nature of qualitative designs (Sinkovics, Penz & Ghauri, 2008).

The most cited system of quality criteria for qualitative research is presented and developed by Guba and Lincoln (Guba, 1981; Lincoln, 1995; Lincoln & Guba 1985). The researchers propose that quality concerns should be geared towards trustworthiness and encompass issues such as credibility, dependability, transferability and confirmability (Lincoln & Guba, 1985; Sinkovics et al., 2008). Dependability matches reliability, credibility internal validity and transferability external validity, while confirmability is replaced by objectivity (Lincoln & Guba, 1985). The criterion of trustworthiness is fitting for our study and will therefore be applied when assessing the quality.

4.4.1 Credibility

Credibility is about ensuring that the realities and understandings of the informants match the realities presented by the researcher (Saunders et al., 2016; Sinkovics et al., 2008). A number of techniques to assist credibility was applied to our process, such as member validation, triangulation and peer debriefing. This contributes to higher credibility and ensures that the findings are plausible (Guba, 1981). The nature of the research method entails that questions could be reworded if they appeared unclear or uncertain to the participants in order to clear up any possible misunderstandings immediately. We approached interviews with this in mind and made use of follow-up questions and asked informants to explain what they meant if intentions seemed unclear to ensure that we understood their intentions and vise-versa.

In addition, Guba (1981) emphasizes the importance of using multiple data sources in order to further ensure the credibility of the research, a process called triangulation. In our case, the participants came from different organizations and have varying and important positions within the ecosystem. This means that our primary data includes multiple perspectives, ensuring that conclusions were not drawn from one position or experience, and that it was developed from multiple sources of information.

The credibility of the findings was further strengthened through peer debriefing with other researchers (Saunders et al., 2016). We had meetings with our supervisor throughout the process, discussions and meetings with the other FOCUS students and finally a presentation which provided important feedback on the research project from faculty members and professors from the Strategy and Management institute at NHH. All the discussions and different feedback was valuable throughout the project.

4.4.2 Transferability

The transferability of the project refers to what degree the study's findings can be generalized (Sinkovics et al., 2008). With the exploratory and qualitative nature of our research project, the intent is not to be thoroughly representative, but rather to "maximize the range of information uncovered" (Guba, 1981, p.81). In our study, the method applied was theoretical sampling, a purposeful sampling that is not intended to be fully representative or typical, but that was rather chosen to uncover the information that is important and relevant to our specific research

project. The conditions and situational context are described throughout this thesis to aid other researchers in comparing the findings and what context they are applicable to.

In a few cases, we found that the informant did not fully understand a concept or term. At this point we would clarify and ask reaffirming questions such as "Is this what you meant?". This challenge could potentially have been avoided if we engaged in a process called pre-testing and realized the interview guide was not always as clear to the informant as we expected it to be.

Another aspect related to transferability is the fact that all the informants are men. This was not intentional on our part, but a consequence of the sample that was recommended by our key contact at RED all being men, except for one woman who was supposedly a part of Sharing is Caring. We initially planned to interview this person, but it was later revealed that she was not very involved with the workgroup or the ecosystem otherwise. We do not, however, believe the lack of women had considerable impact on our study.

4.4.3 Dependability

Dependability is a criterion which is concerned with the stability of the results over time (Sinkovics et al., 2008). In order to guarantee dependability, the project followed a strategy where interviews were recorded and later transcribed in their original language. The processes of collecting and analyzing the data is documented in this thesis, complying with concerns of dependability. This allows the reader to examine the project and our understandings (Guba, 1981). The dependability is further supported by feedback and discussions with our supervisor and professors of the FOCUS program. This is in accordance to Guba's (1981) "dependability audit" that is to be done by an external auditor that is competent to comment on the procedures used.

4.4.4 Confirmability

Charmaz (2006) argues that researchers are obligated to practice reflectivity about what they see and how they see it. We know to put aside personal values and opinions to ensure it does not affect the outcome of our project and processes. Throughout the entire project confirmability was assisted by approaching the process with an alertness to and consciousness of background assumptions (Charmaz, 2006). The data and the interpretations drawn from it are coherent and logically assembled to ensure that there are no bias based on our own

preconceived attitudes (Guba, 1981; Sinkovics et al, 2018). The findings are further supported by the guidance of our supervisor who assisted in the creation of the interview guide and who also gave feedback at multiple times regarding the findings and discussion parts of the thesis.

Additionally, researchers must be mindful of how to reach the informants, gain their trust and obtain solid data from them (Charmaz, 2006). We believe trust was created towards us as researchers because we attended meetings and events where we met some of the informants from the RED. In addition, our key informant, who has a leading position within the ecosystem, sent out a shared email informing the participants of who we are and the project. We also informed all informants that they would be anonymized, and they had the opportunity to ask questions through digital communication beforehand. In addition, like mentioned before, all the informants signed a consent form, which is available in the appendix. We believe these steps ensured that the likelihood of informants holding back information is low.

4.4.5 Ethical considerations

In the context of research, ethics refers to the standards of behavior that guide your conduct in relation to the rights of those who become the subject of your work, or are affected by it (Saunders et al., 2016, p. 239). All students at NHH are required to abide to its ethical guidelines for research (NHH, 2015). Additionally, the study was reported to The Norwegian Social Science Data Service (NSD) to further ensure that all ethical considerations were in accordance to their standards. The codes of ethics apply throughout the entire process and are "designed to avoid poor practice, malpractice and harm, as well as to promote ethical practice and private or public good" (Saunders et al., 2016, p. 245).

All participants were given information about the project in advance and of their ability to withdraw their consent at any point in the process without needing to provide explanations or reasons. The subjects were informed of confidentiality of the data collected and anonymity with a consent form. The data was stored on personal computers until the end of the project when it was deleted and delivered to the FOCUS-institute. To guarantee that the identities of participants would not be revealed, all information such as locations, names or job titles are either replaced with a pseudonym or removed entirely. Lastly, the quality of the research is dependent upon the objectivity and integrity of the researchers (Saunders et al., 2016). To ensure this, we strived to at all times act in an honest and impartial way, both in regard to the informants but also when handling the data material.

5. FINDINGS

This chapter presents the findings from the analysis of the primary and secondary data to answer the research question *"In what way can the establishment of an ecosystem facilitate innovation in the construction and real estate industry?"*.

5.1 Summary

The findings revealed that macro forces in RED's and the other members environment led to the establishment of the ecosystem. RED and the other initiators felt pressure from the technological advances that were happening in their own industry. They gained valuable insight on sharing knowledge and resources with your competitors on an international trip and they wanted to place innovation on the agenda for everyone in the industry. The ecosystem solution was selected because of the ability for collaboration between firms and across industries, how flexible memberships are, the potential of internationalization and the regional benefits from local competences on ecosystems.

There appears to be three main aspects for how the ecosystem currently works as a facilitator for innovation across the real estate and construction industries. First, the activities create an arena for innovation because they are organized for both the expected and unexpected. The activities vary from work that takes place in focused innovation workgroups to the unforeseen connections that happens spontaneously between the members. Second is how the ecosystem facilitates sharing of resources between firms. Challenges related to scarcity of resources and competition between members might, however, interfere with the innovation initiatives. Third, members of the ecosystem have a holistic view of the value chains connected to homes and buildings, which in addition to interdisciplinarity, creates potential for innovation in multiple parts of the value chain at the same time. To fully exploit these advantages members must be aware of issues related to identity and deviating goals.

The last part of the findings reveals how there are three key factors for the ecosystem to continue the innovation efforts. It is important for the members to see results that are directly derived from work in the ecosystem, or else they fear losing momentum and the willingness to dedicate resources. Furthermore, the findings emphasize the need for communication to remind members of the overarching vision of the ecosystem. In addition, RED's position as leader has

to change for their own and the sake of the ecosystem. Last, the analysis proved that establishing trust between the members of the ecosystem will be vital. This will be especially important in the efforts to cope with challenges related to competition, lack of control and sharing.

5.2 Model

A model has been created to make the findings more accessible and easier to read for the user (Saunders et al., 2016). The model illustrates the main themes of the analysis in the chronological order they are presented in the chapter to assist the reader in visualizing the content and the connections. Additionally, it was created to provide a clearer overview of the answer to the research question. The model consists of four parts: The first is the macro forces behind the establishment of the ecosystem. Then the reasons behind the choice of ecosystem as the solution is presented based on the advantages they give. The third part is how the ecosystem currently acts as a facilitator for innovation, including the elements activities, sharing of resources and value creation. The fourth and final part of the model presents the key factors for the facilitation of innovation when the ecosystem moves into a more mature phase - managing expectations, the leadership role and the importance of trust.

Figure 1: Model illustrating main themes
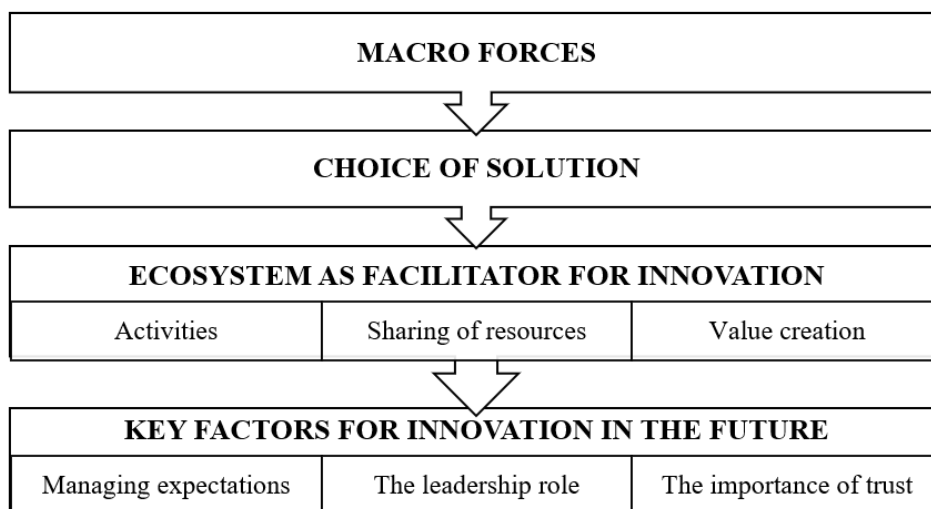
5.3 Macro forces

The analysis of the primary and secondary data found several contextual reasons for the establishment of the ecosystem. RED's motives consist of three parts: technological advances, international experience and industry wide innovation needs.

Technological Advances

When asked why RED had decided to create an ecosystem and why the member firms felt motivated to join, one aspect that was highlighted by many informants were technology and digitalization as drivers. As mentioned in the description of the case and industry, a recent McKinsey report presented evidence of how the real estate and construction industry is lagging when it comes to digital assets, digital usage, and digital workers (McKinsey & Company, 2015). The experiences of the informants were no exception to the findings of the report.

> *In my opinion this is perhaps why the construction industry is so far behind on innovation and development [pause]. We have so much proprietary technology, so much old analogue debt - and then to use the new and the old together, there is such a big gap.*

> *My perception of the ecosystem in Proptech Innovation, it is because we have realized that construction and real estate are at the very end of the innovation cycle.*

According to the informants, the industry was set in their old ways of working, to the point where beginning the discussion of modernization was met with a level of hesitation from employees.

> *The sudden use of words like real estate technology and not having to place cables for miles on construction sites because of wireless technology was sudden - it should work. There was a lot of skepticism too.*

However, there was also an understanding of the need for digitization. Informants from RED highlighted the seriousness of their digitalization needs and what it entailed for the future of the company.

> *Subsequently, we have realized that around 50% of our business areas are directly threatened as a result of digitalization.*

Many people talk about technology, many people talk about data. If I'm going to talk about what we at [RED] have realized - it is a pretty big, radical job that has to be done.

International experience from study trip

Another main antecedent is the international experience from two study trips. Before establishing Proptech Innovation, key actors from RED and a few other organizations from the ecosystem travelled internationally to learn about global trends. Their experience on the trip abroad was eye opening and shaped the direction of how they wanted to approach innovation

The CEO, Vice Managing Director and IT Manager participated in a joint study tour… When they met with [Media Company], and was presented the story of when [Media Company] was disrupted - how it affected the media industry, a good many years ago, and how they had to, in a way, not only recreate product and service development and the pace of innovation, but also the business model had to become completely different. Super interesting case and very relevant [to RED]. This is when the CEO, in a way, says that his mind was blown, because he thought - damn it, this is going to happen to us.

I was part of one of the study trips. Right, with [Informant 2] and, others from Proptech Innovation […] You see that the new business models threaten, in a way, [RED's] foundation, and I can probably agree with that, right, because I think in the future, you will probably expect more of a building than to just live there.

One of the most important aspects that the international experience taught the informants was about sharing resources and information, not only with your complementors, but also with your competitors. One informant place especial significance on this realization.

Then suddenly, to hear in Silicon Valley, all these big talks about sharing; they still compete yes, but where the sharing culture is very widespread. That's when all the alarm bells rang. Is it really possible, should I share with my competitors? […] you have to share the way of thinking - together we are the strongest. We can't change the world unless we share.

RED concluded that there was a need for innovation to happen in collaboration with other firms. Furthermore, the inspiration from the international trips helped shift the focus from how one company can stay competitive, to how cooperation can help the entire industry to evolve.

It pays to cooperate on innovation, especially in a globalized world. In a way the competition is not really between two companies in the Bergen area. It is between two companies in the Bergen area and the rest of the world. So, what you can create together here, means you can stand stronger outward in most situations.

Personally, I think that this is the only way we can somehow avoid being totally eaten by what's going on out there [globally]. And Silicon Valley is in a way the best example of how this works when you have money, when you have investors, when you have start-ups and established businesses together - it just works.

During the study trip with other companies, Informant 2 hears about the term Proptech for the first time. The concept was so new that the informant, with a top management position within the property industry, had never heard anyone talk about it before.

[Director in innovation firm] said, "Proptech is the new Fintech", and I didn't understand [long pause], it's only three years ago, but I thought; Proptech what are you talking about? and Fintech? I had no idea.

The new understanding of Proptech and collaborations became apparent to RED because of the international study trips. It was an eye opener to key players of how vulnerable their companies were, the threats of disruption and how leading actors abroad praised a sharing culture, both with complementors and competitors. Consequently, key informants became aware of, and interested in ecosystem solutions. RED's realization aligned with the understandings from the other members of the initiative. The informants highlighted the fear of being outcompeted and the need to keep up with new demands from the market.

[…] there are some fundamental, big changes happening and they're happening quickly. And we have so many examples [pause] where big players have been completely outplayed in a short time, because you simply don't keep up and there are new actors coming in, who have not traditionally been in that industry and who then take all the value.

Industry wide innovation needs

The analysis revealed that another main reason for choosing the ecosystem solution was RED's inability to innovate and the lack of innovation from firms in their environment. The innovation capabilities in RED was limited and the suppliers and organizations they wanted to collaborate with where not able to provide them with the services and products they wanted or needed. Consequently, the wish was not only for them to innovate, but to influence others in their surroundings as well.

I would say that the innovation work at [RED] was almost non-existent

They may be impatient - where is our industry? We lack lots, we see lots of potential.

When they asked their suppliers for services, I don't think they got good enough services.

This was not just an internal understanding in RED, as other members of the ecosystem also recognized their motivation to influence their business environment. The goal of the initiative is not only to strengthen their position, but the position of everyone who is part of the ecosystem. RED wanted to place innovation not only on their own agenda, but on the agenda of everyone in their surroundings as well.

The cluster effort has been important to put in place for [RED], because then they can put innovation on the agenda internally, they can do that, but they also get innovation on the agenda of the ecosystem around them.

I really think that is the bottom line here, that they want to work in a sustainable way and to keep themselves relevant, because it's very easy to get bypassed, things happen very fast and people are using new technological solutions all the time. So, they probably strengthen themselves and those members. The collaboration probably strengthens everyone's position by being there. I think that's why they did it.

The combination of the discussed contextual reasons led to a sense of urgency for RED. They recognized that something had to change for them to stay competitive.

We have to start over, we have to think completely differently about everything

I said to the management team on Monday, come on, we must embark on a completely different journey than where we are, we continue with this and most of our products will be disrupted within a short time. And I meant that.

But I feel that they got a sense of urgency - that they felt that things were happening around them and maybe they will get completely bypassed here. Then one must either hop on the train or stand and watch it leave the platform [...] And I think that for such a large and complex company as [RED], that it is a real observation.

Summary of macro forces

In conclusion, the most apparent macro forces behind initiating the ecosystem is the technological advancements, the experience from study trips abroad and the need for an innovative environment. RED was threatened by technological advancements being made elsewhere. The initiators brought home new insight related to sharing and collaboration from their study trip and knew that it was the right way to move forward. RED was lacking the needed innovation capabilities and experienced that firms in their surroundings were unable to meet their needs related to new products and services. The combination of macro forces created a sense of urgency, where RED decided to revise their innovative efforts

5.4 Choice of solution

After experiencing a sense of urgency, several factors led to the realization that establishing an ecosystem was the right decision for RED and the other initiators. The many possibilities of collaboration, flexibility, regional benefits and international potential were determining factors of why this solution was selected.

Collaboration

The analysis shows that the importance of collaboration between firms was one of the main reasons for choosing the ecosystem solution. As mentioned, the study trip prompted the realization that there was no other choice than to collaborate. They were heavily inspired by what they saw in Silicon Valley and was convinced that the answer to their problems was sharing and openness between companies, an advantage that the ecosystem solution facilitates.

And some of the other things we learned on the study trip we were on, was this part about collaboration. That we cannot solve all the challenges on our own.

So, the realization is basically that we have to work together. Both with new and non-traditional players, but also to cooperate better with those we have always cooperated with.

The other informants also recognized that RED, and others, need to collaborate in order to create new, innovative solutions. The realization was that if they really wanted extensive change then doing it alone would not be sufficient and they needed an arena that facilitates working with other companies.

The main motivation was that they saw that they had to do something, and that they had to interact more with those around them in order to come up with new exciting ideas.

[…] I think that if you knew exactly what to do and you knew how to do it yourself, then you could have a competitive advantage by doing it alone. But it is not so clear exactly what to do, so you are better off doing it together.

So, I also don't think we should be so naïve to think that we can solve all the world's and our own problems with the products and technologies we create ourselves, that is to say, we are not big enough, important enough […]

Furthermore, an ecosystem for collaboration creates the opportunity of networking with other firms in the industry. It is also one of the main motivations for the other members to join the ecosystem, especially those with lower ambitions and expectations for the ecosystem.

Networking, I think that's quite clear. And network and learning I think is very central to me, maybe, maybe it, maybe it results in business in some kind of way.

There is also something about, we should not underestimate relationship building, networking, is still important in business. Business opportunities also arise, in customer relationships by simply meeting and gathering. You can have as much digitization and digital tools [as you want], but there is still kind of, getting together around a cup of coffee, or a snack, or in some kind of context in the hallway in a break, is as important as it always has been.

Yes, it is a bit to feel the pulse and hear a little bit of what [pause] these are often big customers of us, [RED] and [Construction firm] and the developers and everyone are often our customers, so to catch the pulse, what is important for the customer. What do they care about? And how should we communicate with the customer to trigger them towards cooperating with us? So, we think, and that it is somewhat important, to just sit and listen, that is often a good thing.

Flexibility

An important factor for RED to establish the ecosystem was the flexibility it represents. They value the fact that companies themselves decide how involved they want to be, which also makes it attractive to join initially. The consensus is that they do not mind that some members contribute less because they see value in being many members.

[…] that you can in a way, listen in on what is going on in and around the ecosystem within your industry. Which I believe will be very important for many players. And many joins just because they feel that they have to be a part of it. We can't afford not to.

Informant 2, former senior manager and initiator has some apprehension against companies that do not contribute and that does not have any intentions to do so. He believes that the members must give in order to receive, and the ones attempting to only reap the benefits is believed to be unable to compete in the future anyways.

But if they want to get into the projects, real projects, then they must contribute with both resources and money. Otherwise, they should get the information as much as they want, because they are not, I think that such companies no matter what, are not able to rise and they will never be competitors.

Several of the informants called out the importance of being a part of the ecosystem even if you initially do not reap direct benefits of the collaboration. They look at the ecosystem as a supplement to other initiatives that are present in their own companies.

That, what you do in Proptech Innovation is a supplement… to what we also do ourselves, and then we also have to find a sense of balance and integration between it.

Regional benefits

The analysis shows that Innovation Norway's template on how to build clusters is the main reason for structuring the ecosystem as a cluster. The informants have seen the concept work in other clusters from different industries and they believe in the template. In addition, the informants stated that it is a goal for Proptech Innovation to achieve cluster status because it will grant them funds which will be of great importance for the evolution and potential of the ecosystem.

> *Yes, no, we [pause] with Bergen as a starting point we have said since the start-up meeting, before the foundation [of Proptech Innovation]. And that is really based on the cluster program from Innovation Norway which says that the proof of concept on how to do this is to begin with building a strong regional cluster. And then in a way expand and think nationally, while still having international ambitions.*

> *So, I do believe that following the template of Innovation Norway, which has worked elsewhere, you have better prerequisites for this, than to create an alliance or to create your own initiative on your own terms.*

Additionally, the informants all agree that being close to one another in terms of physical location is an advantage. One of the reasons is associated to Bergen as a city because it already has many clusters with official cluster status through Innovation Norway. Therefore, the informants highlight an advantage in that there is a lot of competence and experience already located in the city.

> *So, we are a cluster city, there are about eight? Seven or eight clusters, and most of them have cluster status through Innovation Norway. No, that does something with us. Fintech [Finance Innovation] and the media cluster were clearly a huge inspiration for us when we started Proptech. They had gone down the path before us and we got a lot for free, because they had thought, they had made all the mistakes, we learned a lot.*

> *The easiest answer is that we look at the other industries and they have really made it. We are world leading in Bergen and the region within subsea technology. We are world leading in media technology, we are trying to become it within financial technology, we are world leading on electrification at sea, so it is only, if you glance up, in a way,*

from your own industry that it is [pause] there is a great deal of exciting things happening in Bergen.

Moreover, the informants point to other advantages of physically being close in proximity, regardless of structuring the ecosystem with a goal to achieve cluster status or not. They believe the closeness is important to build relationships and trust in the early days of collaboration.

And I am a big fan of technology and video meetings and all that stuff, but physical yes, the presence and in a way, to be able to look each other in the eyes and talk about, weather and wind and football and whatever, beyond just sitting around a meeting table and talking about an agenda, that is important.

Clearly you can do a lot without sitting, being close in proximity to one another. At the same time, it's like, it is probably still important to be able to meet and to be in the same room and discuss things.

Potential

With all the digital tools of today and the international ambitions, the question of why the ecosystem currently only has members that is localized within the same city was raised. In addition, other more formalized constellations for collaboration are available, so deciding on the ecosystem solution was not necessarily an obvious choice. The analysis revealed that the answer lies in the ambitions of the initiators. Having an ecosystem mindset gives a broader perspective and the possibility to consider players and companies worldwide as part of your ecosystem. Proptech Innovation have not reached that phase yet, but it is prominent that the potential of the ecosystem as it grows and evolves is important for the choice of solution. Thus, the initial localization and the formal structures of the ecosystem will be less important in the future.

The goal of a cluster project is to make the cluster project unnecessary. Because you get a reinforcing effect between players in the cluster. That is the goal, that you should be able to contribute to creating or strengthening the self-reinforcing effects in the cluster so that the cluster and participating in the cluster gives some advantages in the market for players involved. That is really the goal.

The whole purpose of the cluster itself is that it should become redundant, because the ecosystem just works on its own.

The analysis further goes to show that informants believe that the ecosystem has the potential to influence and advance the real estate and construction industry. The ecosystem has the potential to accelerate changes which could increase the digital advancements in the industry.

What I hope we get out of it is that we accelerate the maturity of the industry. That we get, that we get both new ways of building buildings, also to manage and operate them, and to liquidate or develop depending on, and that we get to that through interaction between all the players. I both hope and believe that we will succeed.

We are aware of the fact that this industry is lagging behind in terms of innovation and cost reduction efficiency. So, we believe that there is great potential within that industry and thus also for the bottom line of [Municipality].

Summary of Choice of solution

Four elements have been identified as crucial for why the initiators chose an ecosystem solution: the advantages from collaboration, flexibility, regional benefits and potential. The need to create an arena for collaboration beyond industry lines was imminent in order to work together to find new and better solutions. Flexibility regarding membership was important because it would make it easier to get many firms to join initially. In addition, the informants emphasized the fact that networking with other firms in the ecosystem is beneficial, implying that different firms would have different ambition levels for their membership in the ecosystem. The informants argued that regional benefits are related to existing knowledge and competence in Bergen. In addition, the ecosystem was initially structured as a cluster to possibly benefit from Innovation Norway's official cluster status. All the informants agreed that it has been valuable to be close to each other in the early days of establishing Proptech Innovation. Finally, the ecosystem solution was chosen because of the international ambitions of the initiators. They realized that in a more globalized world they could not only consider competitors in their vicinity but had concerns of international competition as well.

5.5 Ecosystem as a facilitator for innovation

Moving on to the third part of the analysis and the third part as illustrated in the model, the following segment explores the perspective of innovating in an ecosystem. The informants' reflections revolve around both the positive effects of the solution and the challenges which can hinder the members ability to innovate in the ecosystem. The findings are split into three major themes: activities, sharing of resources and value creation.

5.5.1 Activities

To provide more detailed insights on how an ecosystem creates an innovative arena for its members, the informants were asked about the formal structures and activities within Proptech Innovation. The analysis of the interviews presents two major themes; (1) activities that are flexible, often spontaneous and less goal oriented and (2) focused innovation workgroups. Both types of activities are important and facilitates innovation in the ecosystem.

> *[About structure] but it is precisely also about facilitation, so that human creativity, in a single person or in a group, hits others and triggers something that would not otherwise have happened.*

> *It is important to define a little what, what the ecosystem's organization and framework should be and what it should not be. I do not think we should aim to detail what each member does or does not do, even in the meeting points with others, but it must be the overall structure of the facilitation of the processes that we are trying to enable.*

> *It is important that the project contribute to having arenas where you share thoughts, thoughts about what is happening and where you involve actors who can illuminate it and so on and so forth.*

The structural boundaries for the ecosystem are important, and Proptech Innovation organize not only for the expected, but also facilitate for the unexpected that can happen when people come together to innovate and create something in a less structured manner. The informants further implied that finding the right balance of structure, but not too much structure, is important.

Good enough structures, so purely formal structures and now - an ecosystem is obviously not characterized by too many structures, but there must be enough. First and foremost, for the human contact and creating the commitment, will and enthusiasm that we do something that each of us should benefit from, which also means that we all contribute.

Also, part of the activity in such a cluster project is some very low-threshold activities [...] People meet and there are meeting places, it is so important in itself and things come out of it.

The findings show that what happens spontaneously when people meet as a result of the ecosystem's structure is important. That new collaborations and ideas are also a consequence of people meeting casually in the ecosystem's arenas. Thus, the purpose of arranging activities is both to facilitate specific results and projects and additionally to inspire and create curiosity for what can potentially be created in the future.

Yes, by creating activities that the company as a member, either already feel like gives them something back, or that give them curiosity that there is potential here

Firstly, I think it must be an overarching structure that creates activities that are interesting, that is, which can be like a conference, which after all we have conducted, it can be breakfast meetings, activities, workshops, member meetings.

But I also believe in, the unexpected link that happens. If Proptech Innovation can also be a link for the slightly unexpected, that even if only two, or a few players, come to think that "here we have something common, common interest, different parts of a full solution, which can contribute to both earnings, more efficient operations and increased sustainability". I think that must be a bit of the goal as well, and that can also lead to the start-up of new companies. So, there must also be a goal, and then you have to organize for both the expected, but also the unexpected, through the operation of such an ecosystem.

Single day activities might also lead to more long-term projects. An example of this is how the workgroup Sharing is Caring was established as a result of an early event that every member company in the ecosystem was invited to. Together the members decided on the most important

matters for the ecosystem and the workgroup was created based on motivation and interest as criteria for the joining members.

> *That's the idea. The backdrop here was that we arranged a workshop with all the members where it was decided that [theme for workgroup] is very exciting and that we should spend some time looking at it. So, we then facilitated a workshop with the players who wanted to join and there were nine-ten companies like that. And then had more workshops during the year and came to this foundation [of the workgroup].*

> *Proptech [Innovation] is more the total framework for the ecosystem, facilitating joint activities, maybe picking out some good projects that working groups create around, also that they are natural and partly based on wishes and interest in joining.*

The more focused innovation work happens in the long-term workgroups such as Sharing is Caring. These are centralized and long-term groups of members who work on projects or themes that the ecosystem wants tangible results out of.

> *Additionally, we have established two other slightly similar tracks, one on [Sharing is Caring] and one about development. These are areas where we want to put extra focus and get concrete and specific development projects out of.*

> *[…] but we also want to focus on the areas that can create the most impact. For Proptech [Innovation], it's about data and data sharing and what opportunities that offers and also new ways of interacting [with each other] earlier in the processes to facilitate innovation*

5.5.2 Sharing resources

The next major theme and one of the main advantages of creating an ecosystem, the informants have agreed upon, is the ability to share resources across companies. The sharing of resources enables the members of the ecosystem to innovate in different settings with access to resources they do not fully own themselves. However, the informants are equally cautious about challenges that arise when competitors want to engage in sharing.

Access to data

The result of the analysis is that one big advantage of sharing resources and collaborating with companies in your industry is the possibility of accessing data others have that can be valuable

to your company. The informants also see a large potential in combining data across different companies in order to create new, innovative solutions.

> *The core idea is in a way, that we have to, we have to release data, right, we have to release data from the different silos, from different industries.*

> *[…] operational data and things like that, if you have a lot of operating experience and operating data there is a possibility that we are not able to reap the benefits of it ourselves, but another actor sees that "oh shit, this is good for us", or "we can use this for something". So, this, being able to share these things, it is often a big challenge in these ecosystems, to be able and willing to do so, it is one of the prerequisites.*

Furthermore, the informants appear to be aware of challenges related to privacy regulations. Yet, a lot of questions are still left unanswered when talking about how sharing data should actually work. One issue that was brought up often was ownership of data. When a person generate data, that person owns that data, but the data generated is gathered at a company which in a way then also owns the same data.

> *So, let's say [Power Company] supplies power to every home. You could say they own the data on how much power is used in each building. But I also own data on how much power I've used. And that data is located at [Power Company] and I also own it. And you can do that for each industry.*

> *You can also say that we have some advantages in Norway in that we are trust-based, that is, we operate on trust, but here it is actually about being able to have, the legal, formal, in order. And I think that's important to be aware of, and, and, also in Proptech Innovation.*

For the private actors in the ecosystem, sharing their data is challenging, especially when collaborating with competitors. According to informants from RED, everyone wants to share, but there are difficulties related to ownership and regulation.

> *So, in terms of sharing, it's hard, of course it's hard. And those are the trends in relation to how we live in our houses as well - yes, everyone wants to share, but we want to share on our own premises [said jokingly]. And it is kind of the same challenge we are going to face in Proptech Innovation when we talk about data sharing, okay, but what*

data? Who should own the data? Who should get access to the data? How should this be facilitated?

In terms of sharing and collaboration it is one thing to talk about it, but another thing is to do it. So surely it will be a challenge.

One thing is the ownership of either a data set or a data stream, which one may have to be willing to share, you have to take care of privacy and the legal part, of course, but if that is in order, then you have the potential of value creation from others.

Scarcity of resources

The informants point to the scarcity of resources as one of the main challenges and threats for innovation in Sharing is Caring. Resource scarcity can in turn pose a threat to the success of the entire ecosystem.

[…] one of the biggest challenges is the prioritization when it comes to resources.

Once the projects and stuff start to roll, it can become a challenge to maybe, devote enough resources to support it, of course.

When discussing resource scarcity, every informant agreed that time is *the* resource that will be most critical. They are not questioning the members motivation, but rather acknowledging that they have to balance their participation in the ecosystem with day-to-day work in their respective firms.

I think time is very important, and it is perhaps also the biggest challenge most people have. As a larger company, one should almost give up a percentage position to join. So, I think time will be the most critical.

Of course, it is always a challenge that, the resources, or the people working towards this ecosystem also have a hectic everyday life and may not necessarily be able to spend as much time [on it] as they wish.

But time is a scarce resource for everyone, and that of course, will be, something I think is important to be aware of. If you feel Proptech [Innovation] does not give anything directly back then the willingness to spend time and resources in the individual

businesses will not be there, so, and it is always dangerous when the news interest has settled, you have created something with great enthusiasm, then everyday-life arrives and something has to be run.

Further, the informants reflect on how the different companies will have to consider how much resources they allocate to the ecosystem, when the same resources could be used internally. Informant 4 states that it can be a challenge for members to justify the use of resources on projects with higher risks, in comparison to safer projects internally.

Then there will always be, I think, a budget discussion in every business – how much do we invest in an ecosystem with uncertain gains, versus spending it on something internal that may not have the greatest potential but a securer lower return financially or on human capital. And every company experience, by definition, scarcity of resources when creating a budget for next year, and it has to be a trade-off, between what you spend on internal projects and, and external ones. And I would sometimes assume that investing time and money into an ecosystem has greater potential but also higher risk that there will be no return. So, I think a sensible business can do both, and must make an assessment of where the balance lies.

A comment made by informant 7 illustrates how some of the companies might evaluate which projects they will devote resources to and which they will not. The informants are already concerned that members will prioritize work they know will generate income unlike the projects in the ecosystem that are more uncertain.

It's a completely different mindset, there are big differences. I assume that the players in the ecosystem will prioritize work that is aimed at a specific customer, rather than the ecosystem. Although it is very fun and fancy, I think they will prioritize work that raises capital.

Competition

An inevitable challenge in an ecosystem is the balance between cooperation and competition. On the one hand, cooperation can be limited because of members restraint against collaborating with their competitors. On the other hand, collaboration is limited by the rules set by the Norwegian competition authority. The biggest challenge is however related to how much

information you want to share with your competitors. The informants concur for the most part on this aspect.

> *That we say yes, we will cooperate when we can and compete when we have to.*

> *After all, there are many of us who are fighting for the "position in the homes" that everyone is talking about. And there are many competitors who sits as core members of the cluster […]*

> *The ecosystem handles both collaboration and competition all the time. And they will have to regardless of the cluster, to put it that way. So, it is part of what characterizes a well-functioning ecosystem, that one manages to handle those things. The cluster project can help, to be a little more open because we can be a little too careful when it comes to sharing our ideas. […] because the least productive ideas are the ones you keep to yourself and get nothing done with [laughs].*

There is also a difference between how this challenge is viewed by the private actors and the members from the public sector. The latter highlight how their position means that the strategic aspect of collaborating with competitors is not something they worry about.

> *I think that, in that area, there is one less thing to think about for a public sector player than for a private, because we don't have that kind of strategic competition to think about. But I think that for the vast majority of private companies, they will get the same answer – collaborating on innovation pays off.*

The findings show that the informants further relate the competitive challenge to ownership of processes and innovation. One informant from the public sector discusses how this is not crucial to them.

> *For us it is not important to have ownership of innovation or the process, it is not important where it takes place, it does not matter who implements or develops the solutions. So, we are not in a competitive situation.*

Private actors, however, have different concerns. They highlight how important ownership is when engaging in work outside of your organization because it is uncertain how much it might benefit your firm in the future.

Ownership is also incredibly important. Through ownership I think we can develop new products, we have to. If you don't have ownership, then I don't think things are going to happen. Because then it is, it's very easy to have an opinion and think and believe, when you don't have ownership, when it starts costing you money, that's when we'll see if they really, really mean it. So, there are probably some who have joined an early [work] group who dropped out. Because they didn't have ownership, and that's okay!

5.5.3 Value creation

The final major theme in how the ecosystem facilitates innovation is how it can lead to greater value creation among the members. Hereunder the combination of a holistic view on the value chain that spans multiple industries and the idea and competence gains from interdisciplinary value creation, with challenges related to identity, motivational concerns and deviating goals among the members.

Value chain

The informants explained how working together across their usual boarders allows them to approach the challenges and opportunities at higher levels, not just in the parts of the value chain they are directly responsible for. The analysis provides insights on how the informants view the members of the ecosystem as representatives for different parts of the same, more encompassing, value chain.

[…] it is to lead companies with different ownership in different parts of the value chain in the industry and try to get them to unite in a common goal to create something, it is advanced management, really.

At the industry level, that we might come a little further down the road than we would otherwise, on some of the overall challenges the industry has, high value creation, but weak productivity growth. Large climate imprint and digitally immature. It goes without saying that this is where we should improve, perhaps first and foremost.

In a way we need to gain a greater understanding of how the value chain works, how we can influence it. And then if you manage that through Proptech Innovation, for both architects and contractors and municipality and all others who are there - then it is absolutely superb.

For Informant 6, who represent a waste disposal firm, the ability to affect more than just what you do alone is a key motivational factor for joining the ecosystem. Circular economy is of great importance for a waste disposal firm, and it is not a challenge they can solve alone. Innovating in ecosystems is therefore suited for innovative processes that involve the entire value chain.

> *Yes, and it relates to, in a way, circular economy and general competence raising, and understanding of our value chain. Because again we cannot, cannot sit [alone] in our office and create a circular economy, it does not work.*

Several of the informants bring up the fact that an ecosystem can be an appropriate arena to start looking at sustainable solutions for the industry because of the access to a greater part of the industry value chain. Many of the informants bring up statistics that says that the construction and real estate industry is responsible for more than 40% of CO_2 emissions and how the ecosystem makes it easier to reduce their negative environmental impact.

> *I really believe that this is the future and I really believe that this is the solution to finally reduce our carbon footprint in construction.*

Aligning goals

When asked about the goals of the ecosystem, the informants were positive that it is important for the ecosystem's success in its innovation efforts that the members have similar goals and a common understanding of the overarching vision. This relates especially to how some members want to prioritize efforts close to their niche, while others have different goals and expectations.

> *You have different interests across and outside your value chain. Which hopefully has a coinciding goal. And I think that in order for it to work, I think it's very important that you have an overall goal, a vision, something that everyone can agree on, which is concrete enough that you know what direction you want to go, yet vague enough that it doesn't get too narrow*

> *Have an overall goal [some laughter], yes, have something that everyone can agree on, also you can, you can often spend some time on it, but do not start running too fast before you have it, because then everyone just runs off in their own direction*

However, it can be challenging to get everyone to agree, when different members of the industry have different areas of expertise and priorities. There are many different stakeholders present, and one must find similar agreements on what projects the ecosystem should spend its resources on.

> *It is in no way given that the players sitting in the cluster have equal priorities.*

> *I think real estate is very large, so I think not everyone understands the different niches. I think that's something you meet. I think and that it can be frustrating because everyone here thinks that what they see is the most important thing. Yes, it often happens that you are focusing on your own work.*

For leaders in the cluster, managing everyone's wishes for what should be the goals, projects and focuses, may be challenging. The informants from RED are concerned that it will be challenging to prioritize between the different ideas and innovations.

> *And our biggest challenge now is that we must not lose momentum, while at the same time having to structure our work [pause]. We have to eventually touch ground and make some priorities and the most difficult of all, in innovation work in my experience, is to choose what not to do, because everybody wants to do everything, and everything can seem like a good idea.*

In relation to how members have different interests and are not always in agreement of what innovation projects are the most important, some informants are worried that the ecosystem will forget to focus on simpler innovation projects in favor of only the big, disruptive ideas. While a different informant thought the ecosystem is only worthwhile if they go for the biggest and most disruptive ideas.

> *I think it's important for the ecosystem that they have the ability to see the small innovations as well. It's the everyday innovation that is very important, at least for me, and that one doesn't just focus on "here we will come up with something [radical]", of course that is a hope, but it is so incredibly difficult to get it [laughter]. So, I hope they bet high, but don't push anything away because it's too small.*

> *It is important that we do not think that innovation is just about the great, disruptive forces that replace something. Innovation happens, and it should happen in every*

business, in small improvements all the time. Everyday innovations should not be underestimated.

[About innovation projects] I just think there must be something like - earlier we spent 2000 hours on this, now we spend 20 minutes. That is what everyone else does. That is disruption.

Interdisciplinary value creation

The next part of the discussion on innovation in the ecosystem perspective, is emphasized by many of the informants as the advantages from interdisciplinary value creation. According to the findings, this is one of the biggest benefits and facilitators. Informants relate interdisciplinarity to the most exciting and radical ideas.

Often, not always, but often the most exciting thoughts arise when different areas of expertise meet. It makes it so that well-functioning innovation with many meeting points reinforces the prerequisite for driving innovation

I also believe that in this interdisciplinary collaboration, there will be examples of radical innovation, and perhaps especially in the processes that cut between several types of businesses

I believe that innovation is very strongly dependent on, or greatly enhanced by, interdisciplinarity [...] And I think that ecosystems can contribute to that.

Connecting the different areas of expertise in a setting where everyone wants to create and solve problems is one of the main elements of the ecosystem that facilitates innovation. This is further underlined by informant 3 and 5 by the relation to the long-term network effect of interdisciplinary value creation.

We come up with completely different thoughts and ideas when we work together on [innovation], than we would if we worked individually. In addition, when we are done with that process, we have a network to work with on the implementation.

[...] then it is important to get the interdisciplinary cooperation. And in the clusters, you get a stability and a duration around it. To a much, much greater extent than, for

example, in a workshop where you have a network that you invite, then the next time it is a completely different environment you end up with.

Identity and motives

A possible threat to value creation that was discussed by the informants are issues related to identity and motives. In arenas where people from different organizations meet to combine their competences and resources, the members need to balance the possible divergence of interests between their respective firms with their role in the ecosystem.

I think that and I experience that one must in a way leave, must leave, not loyalty but the identity a little at the door and not think that you represent [Member firm] and should come out of it with something that benefits [Member firm], that's only good for the business you come from, but you take a slightly more holistic approach.

One must first and foremost, and we talked about it at the very first meeting, that one must put away all existing business models. You cannot join and think that now [Member firm] will sell so and so many more hours from connecting with everyone here. You just have to put that aside, you also have to think about what we can contribute, what kind of expertise do we have that can lift something or someone here to improve. That must be the premise. If you come into that environment and think that you should capitalize so fiercely yourself, you have the wrong basic attitude.

One must bring openness, willingness to share also one must put away [pause] you are not here to make money today. It's not going to happen, if you think so, you're in the wrong arena.

The various motivations are not necessarily negative, as different roles can contribute different things to the ecosystem. It is, however, important to be understanding of the different motives. The challenge arises if the members attitude is too guided by a wish to benefit the firm they represent, rather than having a more holistic approach. The informants go on to discuss the different motivation and incentives for joining.

Yes, there are many free passengers still, they have not [pause] yes this was popular, and they see that all the big companies are in on it, so it is clear we must join here. But they do not intend to contribute as much. But I say, that's fine.

And it's probably also something we should work on especially when we have become so many members, what are the expectations of particular members. But one can not only receive, an ecosystem is completely dependent on someone giving, and everyone has to give, so if everyone is to receive then everyone must also give. And sometimes we have to talk about that. That can be demanding, because people have different incentives and motives for being involved, I just think we have to admit that.

It is essential that the members do not join with the sole intent of benefiting their own firms. Informant 7 discussed how this was a challenge in the beginning as certain members acted more as a salesperson for their firm than equal members of the ecosystem.

What I experienced at the first meeting was that you could see that there were some who were there just to [...] you could see that people are pulling towards a potential customer to sit with them. And it was kind of weird. I noticed it several times, we don't like that. Because then there is an agenda that doesn't belong there. So, it's not, it was a little funny [laughing]. We talked about it when we got back in the office that yes, there were some who were there to sell. Not to contribute.

I hope it is not limiting [for the ecosystem], but I fear it is. Everyone can say that they have good intentions, but in the end, it is the bottom line that rules.

This is the only informant who brought forward this experience at the first meeting. Additionally, this is also the only informant who is not a member of Sharing is Caring or day-to-day operations of the ecosystem currently. It supports the importance of not approaching the ecosystem as a salesperson for your firm, but rather with the intent to contribute to the innovative environment. Informants from RED also talk about understanding the different motives for the members and how it is important to have a leader that focuses on the overall goal.

There are some different motivations there, some degrees of inequalities probably. Some are sitting with big ships that need to be turned around and changed and which are demanding processes that need all the help they can get. Others are there and are maybe looking for some projects that they can become part of and make money from. Others are looking for clients or partners with whom they can develop their services.

If I as a [RED] employee was to lead this initiative, then I would obviously have wanted to move it in the direction where the upside for the [RED] is greatest. It is hard to "wear two hats", but even though it might be tricky to go in that direction for business and innovation, we want and prioritize more in that direction, so I think it is crucial that it is a knowledgeable person with high competence leading the group in relation to the overall goal.

Summary ecosystem as a facilitator for innovation

The findings reveal that the activities that are flexible and have spontaneous interactions, and the focused innovation workgroups, are both important structural initiatives within the ecosystem. Sharing of resources is an essential part of the facilitation of innovation. Access to data through collaboration in the ecosystem poses great possibilities for the members because it can lead to new innovative ideas and products. However, there are many challenges and regulations that need to be taken into consideration. Competition between the members can be a hindrance for resource sharing within the ecosystem, but members from the public sector could potentially offset the difficulties by leading the way. While resource scarcity seems to be one of the biggest challenges for the ecosystem and poses a real threat to the success of the project. The informants are already concerned that members will prioritize work that they know will generate income unlike the projects in the ecosystem that are more uncertain but have large potential. The potential for greater value creation stems from interdisciplinary work and a holistic approach to the value chain that spans across both firms and industries. While hindrances to these matters centers around the members differing identity and goals.

5.6 Key factors for innovation in the future

Until this point, the findings contain what the members of the ecosystem have done and how the ecosystem currently facilitates innovation for the members. However, the ecosystem will be moving forward into a more mature phase and in that context, there are a few key aspects that the findings presents as crucial. This is the last part of the findings and the model that was introduced in 4.2. The first key aspect is the importance of showing tangible progress and results and how the leaders of the ecosystem are using communication to manage expectations. Next is how RED's role within the ecosystem will evolve into the new phase before finally presenting findings on the importance of establishing trust.

5.6.1 Managing expectations

When innovating in an ecosystem, management of expectations is a key aspect, especially since ecosystems do not have the same hierarchical leadership structure or is bound by contracts in the way inhouse innovation projects or interfirm relationships usually are. As Proptech Innovation is a rather newly established ecosystem, the informants were asked about their expectations of results from participation in the ecosystem. One thing that was apparent is how important it is to show progress and results for the ecosystem to keep its momentum. The efforts must show tangible results for the ecosystem to stay innovative. Many informants consider the results from Sharing is Caring to be make-it-or-break-it for the future success of the ecosystem.

> *We need something that nobody else has ever achieved in a new way, at a better price and with high value. It is pass or fail [for the ecosystem].*

> *I think that is important, because you live on the enthusiasm for a while. By creating something new. But if no one sees that this has any effect then I think things can crumble. And you certainly have examples in other business ecosystems, nationally and globally, that there is a lot of enthusiasm to start with, then things slip into the grey everyday life and you do things yourself anyway. So Proptech Innovation must be concerned with that.*

> *If it [the ecosystem] doesn't show progress or something that in a way draws many people in the same direction, then I think we will quickly fall into such individual projects here and there, between two and three members and then the ecosystem loses its power.*

As mentioned in the quotes above, one way that the ecosystem can show progress and results is through the projects in Sharing is Caring. The informants agree that being a part of an ecosystem can benefit you firm, but that it can be difficult to show results or benefits from projects or events that are less specific.

> *But if you are sometimes challenged on what this has specifically given my company, it can be difficult to document, you can argue, but it is difficult because the causal relationship is not always easy to show. That's how it is. Because the effect for a company can be indirect, indirect, indirect. It may be that a partner and you got a little bit better that helped you succeed. Or it can mean that when you talked to the start-up*

you got an idea that you brought home and worked on in house. We can't document it on the bottom line and say you made 5 million more a year than you did before due to the cluster project, we can't measure that.

So, it's a bit of a communication task, because research on this type of projects show that they give value […] But you are not always able to make that value visible at the individual company level, it is perhaps the biggest challenge.

The leaders of the ecosystem utilized storytelling as a tool to help ensure that every member is pulling in the same direction and that they all have the same overarching goal. This could perhaps draw some of the attention away from the importance of results at an early point according to the informants. The findings show that when there is a lack of official hierarchical structure and power, storytelling can be a compelling way to ensure unity between members. Furthermore, it can be used to keep the members inspired and motivated when there is no progress on projects that can be presented currently.

No, that goes back to storytelling then. So, you have to have a, you have to have a soft approach right, it's not [pause] you have no stars on your shoulder or hammer in your fist. You have to, in a way, create a common understanding and confidence to make it work.

And then, in a way, I will tell you about the journey, the story that [RED] is on, to somehow visualize that there is a bigger picture here, that you can't necessarily figure out from day one.

In addition to the storytelling, the importance of clear communication, and how that sometimes could be difficult was also a topic brought up by informants from RED. Informant 4 has many years of experience in senior management and emphasized the importance of being direct in your communication when a project is not providing what the ecosystem needs.

What are the expectations? What can you contribute? You also have to make adjustments because suddenly a project turns out to be - that not much is coming from it. Then you have to be cynical enough to say, "You know what, we shut it down, we do something else".

5.6.2 The leadership role

In the first phase of the ecosystem, RED has had a strong leadership position. Their important position in Proptech Innovation has not gone unnoticed with the other members. Informant 8, a consultant and technology representative, provides an example of how obvious their leading position within the ecosystem is and presents it as something that can become difficult for the other members to handle in the future.

> *It can become difficult to handle or it can be misinterpreted, or it can be [pause] yes, with [RED], which has a very large ownership stake. If you look at the breakfast seminar today it is [RED Employee], [Consulting Firm] which is fully hired by [RED] and [Informant 1] from [RED] who is arranging it […] So it is quite clear that you will have growing pains there.*

RED wishes to take a step back from this position when the ecosystem becomes more mature, as they are currently spending a significant amount of resources and funding on the ecosystem, compared to other members. Informant 2 from RED reflected on how their leading role can change and how the power dynamics between the members in the ecosystem shifts.

> *At first it was only [RED] that marched in front and then everyone followed, and they still do partly. But now we realize that [other members] have some muscles and now they see that yes, maybe okay [RED] - great what you are doing, but we want a slightly different direction.*

5.6.3 The importance of trust

Few of the informants mentioned trust explicitly, but its importance was obvious throughout the interviews and analysis. Informant 4 reflects on how the members of the ecosystem have to trust each other and that since collaboration in an ecosystem is less formalized, they rely on a trust-based approach.

> *[…] trust-based approach, right, we have an overarching goal, and we have to trust each other, right, that we have our common best in mind. And that it is not something that we should be involved in to gain a competitive advantage and so on.*

> *Collaboration in the ecosystem requires that you are willing to open up. If everyone just sits and keep their own information and does not share knowledge and information,*

is not willing to share what projects they are working on then there will be no collaboration. So, when it comes to being willing to be a little open and offer to share of oneself and one's own business, and not be so terrified of competition. But of course, one must also take into account that it is not everything you involve everyone in, but somehow lower the boundaries of sharing.

The informants are hopeful that the ecosystem can become an arena where competitors and complementors come together to not only share knowledge of what they did right, but also of what they did wrong. Being able to do so is dependent on establishing trust between the members.

[…] also, it is about not being afraid to confess about their, not defeats, but possible failures, right. You are at gatherings, day seminars and those types of things, where people are just praised and are showing what they are good at. But if you do not tell others where you have stumbled, then people will stumble in the same places again. So I think that is extremely important, that people dare to expose themselves a bit... and I think others can benefit from that.

[…] so to share, that we can inspire others and be inspired by others and share experiences with others, that is the very key to being able to survive in today's environment that is ever changing.

When asked if they think that there might be some innovation ideas, they believe that members might not want to bring into the ecosystem, informants suggested that some members might be hesitant if there are aspects that are sensitive to competition.

No, because that, then, is the competitive-sensitive thing, that is, what one would not like to share. [pause] there will probably be much greater challenges if people that see a business opportunity, see a - something that they don't want to bring into an environment where their competitors are.

Informant 8 was especially concerned with getting rid of proprietary systems and encourage openness and transparency between the members. He believes that closed systems limit the ability to share between members of the ecosystem. The findings show that to achieve openness and transparency, trust must be established between the members.

What I think is good about Proptech is that it is about openness and sharing. We are stepping away from proprietary systems […]

My greatest wish, after all, is to in a way agree upon delivering open, transparent systems. So that data is shared, so that there are many companies doing it and want to give us high value, but essentially fronting openness and sharing.

Summary of the key factors for innovation in the future

The analysis emphasized how management of expectations is an important factor for the members in the ecosystem. Demonstrating that the ecosystem's project has actual progress and results that the members can witness, while communicating the overall purpose with tools such as storytelling, will be important for the ecosystem's ability to facilitate for innovation moving forward. The transition from a clear leadership and initiator role, to a situation where RED will be more equally dependent on the other members will be part of the maturity process for the ecosystem. How the ecosystem handles the transition from a new initiative with momentum, to a stable solution and continued innovation is important. Finally, many of the challenges that the informants emphasized are heavily related to trust between members. Since an ecosystem is less formalized than many other structures for collaboration, trust is an especially important aspect for coordination in the ecosystem.

6. ANALYSIS

In this segment the contributions from the findings will be discussed and analyzed. The main findings will be seen in relation to existing literature. The contributions to literature on how ecosystems facilitate innovation will be presented in a table and are related to four dimensions: the establishment and choice of solution, the connection to the innovation ecosystem stream, the roles of the ecosystem and finally challenges related to sharing resources.

The findings suggest that the establishment has a complex reasoning, and that one of the reasons behind the ecosystem initiative is the need for new technical solutions and direction across industries. Jacobides et al. (2018, p. 2260) argues that the reasons for the establishment of ecosystems is that "there must exist a significant need for coordination that cannot be dealt with in markets, but which also does not require the fiat and authority structure of a central actor". This is consistent with our findings, where RED's idea is to place innovation not only on their own agenda, but also on the agenda of actors in their environment so that they are all on the same path of innovation and digitalization. The representatives from the other firms also confirmed the need for a larger system in order to change the industry as a whole.

The findings further support the literature on establishment of ecosystems where it is argued that ecosystems emerge deliberately as a result of initiatives from different parties (Jacobides et al., 2018). The ecosystem was decisively initiated in a period of technological advancements and discontinuous change for actors in the real estate and construction industry. In the existing literature, however, the discussion of new technology is limited to ecosystems where members are connected through a platform as the focal point or to the already existing presence of modularity (Bogers et al., 2019; Shipilov & Gawer, 2018).

Additionally, when exploring how ecosystems emerge, Shipilov & Gawer (2018), theorize that the presence or absence of modularity can determine whether an ecosystem will be established. However, the construction and real estate industries are not very modular. Hence, modularity was not a decisive reason for the establishment of the ecosystem in this case.

A question of why the initiators decided on an ecosystem solution in order to prompt the level of innovation in their industries was asked because there are other more established ways of structuring collaboration between partners. Four main elements were identified. The need for an arena to collaborate, flexibility in order to facilitate for different companies with different

needs and ambitions, the potential to expand in the future, and the regional benefits of establishing the ecosystem initially in Bergen. Due to the technological advancements being made in the industry there is uncertainty about what digital systems will become dominant in the future. The members of the ecosystem utilize focused innovation workgroups, where they can pool their shared resources together and collaborate on developing new solutions. Our contribution is that our case shows that the informants wants to innovate in the ecosystem in order to spread the risk, uncertainty and costs associated with new technology.

The findings propose that the possibility of viewing the actors or a subset of actors in an ecosystem as part of the same value chain allows the ecosystem to approach challenges and opportunities at a higher level. The members of the ecosystem have a view of value chains that spans beyond the activities of a single firm. This enables boundaries to shift for more efficient reconfigurations and encourages innovation to happen on several parts of the value chain at the same time. The findings further present evidence that the ecosystem facilitates innovation as a result of interdisciplinary value creation. The ecosystem offers access to a range of different competences such as knowledge or skills, which are linked closely in the findings to the most exciting innovative ideas. The idea that actors in an ecosystem are motivated by not needing to do everything themselves or be experts on all parts of the value chains is not new insight in the literature (Adner, 2017). However, our contribution is that the advantages related to interdisciplinarity and the value chain perspective are also elements that also facilitate innovation that affects multiple actors on several parts of the holistic value chain.

Because there is no clear agreement on what the defining traits of an ecosystem is in the existing literature, it is interesting to see what definition is in agreement to the findings of this study. Bogers et al. (2019) presented a newer and broader definition of an ecosystem as "an interdependent network of self-interested actors jointly creating value". This definition is appropriate because the four traits can all be identified by this study. The actors in the ecosystem can be characterized as self-interested, perhaps with the exception of organizations from the public sector whose mission is to create public value rather than to maximize profit. The companies are all interdependent of each other to some degree, and some of them also have prior relations with one another. The goal of the ecosystem is to create joint value that spans across industries. All the parts of the definition presented by Bogers et al. (2019) can thus be identified in the analysis. However, the definition does not consider different levels of self-interest between members from the public and private sectors like our findings suggests.

The innovation ecosystem stream is more focused and anchors the ecosystem onto a specific "focal offer" or "focal value proposition" which is aimed at the end-user (Shipilov & Gawer, 2018). It is argued that the ecosystem spans beyond the boundaries of a single industry, with the aim to include all actors required for the realization of a value proposition (Adner, 2017). This is in alignment with the studied ecosystem, where there is a wide range of industries represented. The ecosystem is centered around the customer solution of housing and buildings. Every activity and project within the ecosystem are geared towards finding solutions and ideas that encompasses the home or building in the center as the focal value proposition. This further supports the literature on innovation ecosystems where the focal point is the value proposition from the consumer perspective.

What is particularly interesting in Adner's (2017) view of an innovation ecosystem is that the actors are not those that are already linked through existing arrangements, but those that would need to align for a value proposition to be realized. This is in accordance to the coordination that the analysis revealed to be happening with the ecosystem. RED has gathered actors who can contribute to their innovative housing-related needs, both within and outside their own industry. The literature provides less insight on what types of innovation specific activities that take place in the ecosystem setting. Our findings contribute by suggesting that one of the ways the ecosystem facilitates for innovation is by arranging two types of activities. The purpose of these activities is two-sided, to enable work on specific projects and additionally to create an arena for spontaneous interactions between the members.

The innovation ecosystem literature also highlights that the focus on the value proposition requires an ecosystem analysis to consider the extent to which there may be divergence of interests between members (Shipilov & Gawer, 2018). This is in accordance with our findings, where there is evidence present that both interests and expectations differ among the members. We contribute to the literature by suggesting that the reasons for the divergence of interest is related to the members different identities and motivations. Motivations spans from members who mostly wish to observe, to members who are prepared to contribute extensively to the ecosystem. Additionally, some actors wish to focus on a specific niche they represent or perhaps see an opportunity to take advantage of the ecosystem as a salesperson. Members balance between representing their respective firms' interests' and contributing to the ecosystem as a whole which can affect the innovative efforts of the ecosystem.

The findings place significant importance on management of the members expectations and goals for the ecosystem, which will be a key factor for continuous facilitation of innovation in the ecosystem. The findings are in support of Bogers et al. (2019), who proposed that different types of interdependence between the actors will influence whether their respective goals are competing or complementary. The members experience different levels of competition in the ecosystem and they all acknowledge that the degree of alignment between their goals will influence their ability to achieve success and innovate. Some members have mostly complementary interdependence with other members in the ecosystem, such as the public sector firms that are represented. Others have more complex competitive and cooperative interdependencies, where tighter collaborations and a certain level of competition is present between the actors. In turn, our analysis suggests that the different types of interdependencies, identities and motives are the determining factors for the deviating goals and interests between members in the ecosystem. These factors present challenges to the facilitation of innovation in the ecosystem.

Our findings show that the actors that make up the ecosystem are direct competitors, complementors, start-ups, established firms, public serving firms and consultants. In our analysis, the roles of these members were not as distinctive as Dedehayir et al. (2018) suggest. The informants were explicitly asked what their roles in the ecosystem was, but they all, except for representatives from RED, described their position from the perspective of what company they represented and not what their role in the ecosystem involves. An explanation for this finding is that the informants are interviewed in the emergence phase of the ecosystem which is in alignment with research that suggests that the roles will change during different phases of the ecosystem's development (Bogers et al., 2019). At the present time, Adner's (2017) division between followers and leaders seems to be the description of different roles that is most appropriate in the ecosystem.

In this thesis, RED was identified as the leader of the ecosystem. Dedehayir et al. (2018) suggest that the four main activities undertaken by the leaders are governance, forging of partnerships, platform management and value management. The analysis presented evidence that RED took the initiative to create partnerships and recruit members, they arrange most of the activities and finance the ecosystem to a large degree. Additionally, our findings suggest that the success of the ecosystem is dependent on how RED manage their own commitment in the next phase, which is supported in the literature (West & Wood, 2013). Gawer & Henderson

(2007) claim that the success of the ecosystem is also linked to the leader's understanding of the unique characteristics of the ecosystem itself. The findings do not support (nor directly contradict) the theory where understanding the characteristics is presented as a highly important leadership trait. Instead, this was not once highlighted as important traits by the informants when asked about the success of the ecosystem or its leadership.

Other researchers suggest that the leader engage in initiatives aimed at legitimizing them as generous actors that cares not only for their own self-interest, but about the prosperity and collective destiny of its ecosystem members (Gawer & Philips, 2013). It can be argued that RED does this by hosting and financing most of the activities. What is less clear in the theory is what effect it has that one of the members, that supposedly should be on equal terms as the other members, are in fact the leaders of the ecosystem. Our findings suggest that the leader role in an ecosystem is more complex due to the aspect of competition. In addition, the findings present that RED as the leader has had a rather prominent position of power during the establishment of the ecosystem. Our contribution is that the leader of the ecosystem in the first phase inhabits substantial power. The ecosystem is very dependent on the initiative of the leader in the early phase as they decide the direction of the ecosystem to a large degree.

The findings on sharing of resources between the actors supports the argument that one does not need full ownership of resources for them to possibly lead to a competitive advantage (Lavie, 2006). The extended theory of the RBV with the role of network resources is in accordance to our findings, where sharing resources, such as data or competences, is one of the main aspects that the informants believe is crucial for innovating in the ecosystem. The network resources could possibly lead to competitive advantages, regardless of who has full ownership of them. When reflecting on sharing of data, the informants explained how a company could own a set of data about consumer behavior, that is of little use to them by itself. Another company in the ecosystem owns a different set of data. They could then, together or with a third party, collaborate on extracting useful information from the combination of the information. This represents one of the main advantages to innovation in ecosystem settings. When studying ecosystems, even though the players are self-interested, the aim of achieving a competitive advantage is not as prominent among the members as in the network resource theory. Achieving competitive advantages are rather implied to be secondary consequences to the primary goals. In our study the informants were more focused on how the sharing of

resources could create larger innovation opportunities that in turn could prompt bigger changes to the entire industry.

One of the challenges presented in the findings is scarcity of time for individuals in the ecosystem, and especially in the workgroup. The informants point to the importance of showcasing progress and results in the near future as crucial for the ecosystem and its survival past the emergence phase. If the members are given enough time for their innovative work in the ecosystem, it is more likely that they will be able to achieve results and success. The challenge in an ecosystem, however, is that no one can demand or control that everyone in the same workgroup have a certain amount of time dedicated to work on the innovative project. The members represent different firms with separate arrangements and company cultures, and the ecosystem's leaders do not have the necessary structural control to impose any specific arrangement to ensure that the members contribute enough time for innovation projects to succeed. Theories about networks and alliances often assume the presence of a certain level of formal structures around the arrangements (Shipilov & Gawer, 2018). Literature about innovation ecosystems, however, often characterize the ecosystems as solutions with little structure and control imposed on its members (Jacobides et al., 2018). Our findings contribute to existing literature by proposing that the lack of control in an ecosystem setting can be a threat to the ecosystem's ability to facilitate for innovation.

Finally, the importance of establishing trust was identified as a key aspect for successfully innovating in the ecosystem. Few of the informants brought up the issue of trust explicitly, but the theme was obvious throughout the interviews. Establishing a strong foundation of trust will be helpful when actors attempt to manage issues related to competition between members or when sharing resources such as information and data. The study contributes to existing literature by suggesting that in a less formalized constellation like an ecosystem, interpersonal traits like trust become essential for the coordination of members.

Table 3: Overview of contributions to literature

Theme	Description of contribution
Ecosystem establishment and choice of solution	By choosing an ecosystem solution, the members create an arena where technology can be developed by several actors which in turn reduce costs and risk related to creating and testing new solutions.
	The advantages related to interdisciplinarity and the holistic value chain perspective are elements that can facilitate innovation on several parts of the industry-spanning value chain.
Innovation ecosystem stream	The ecosystem can facilitate for innovation by arranging two types of activities. The purpose of these activities is two-sided, to enable work on specific projects and additionally to create an arena for spontaneous interactions between the members.
	Members balance between representing their respective firms' interests' and contributing to the ecosystem as a whole. These factors present challenges to the facilitation of innovation in the ecosystem.
Roles in the ecosystem	The initial leader of the ecosystem inhabits substantial power and influences the direction of the ecosystem. The ecosystem is highly dependent on the initiative of the leader in the emergence phase.
Challenges of resource sharing	A threat to the ecosystem's ability to facilitate for innovation is that leaders do not have the necessary structural control to ensure that the members contribute enough time and resources.
	In a less formalized constellation like an ecosystem, interpersonal traits such as trust becomes essential for the coordination of members.

7. CONCLUSION

In conclusion, this study has enhanced the understanding of *why* ecosystems emerge and *how* they function as innovation facilitators for the member firms, by studying the research question: *In what way can the establishment of an ecosystem facilitate innovation in the construction and real estate industry?* We expand the ecosystem literature with empirical findings and provide both theoretical contributions and practical implications. Limitations and suggestions for future research will also be presented.

The ecosystem was established because of deliberate initiatives from RED and the other initiators, as there was a need for coordination that could not be solved in markets. This is supportive of arguments in existing literature that goes beyond the idea of technical modularity and it provides further insight into how macro forces, environmental uncertainty and discontinuous change connects to the establishment of ecosystems (Jacobides et al., 2018).

Our findings presented four reasons related to the choice of establishing an ecosystem as a solution. Collaboration, flexibility for companies with different needs and ambitions, the regional benefits of establishing the ecosystem initially in Bergen and the potential to expand in the future. Our theoretical contribution is that one of the main advantages of establishing the ecosystem is the opportunity for developing and testing new technology with several other actors from the industry in order to reduce costs, risk and uncertainty.

By combining the benefits from interdisciplinary value creation and the holistic view of value chains, this study contributes to the literature by suggesting that these elements can facilitate greater innovation projects which affect several parts of the industry-spanning value chain.

This study supports the theory stream of innovation ecosystems where the ecosystem is directed at a focal value proposition (Adner, 2017). The members of the case are not only those who were already linked, but rather those who need to align to realize said value proposition, which spans across industries. Consequently, this implies that all activities of the ecosystem are geared towards realizing the value proposition. One of the ways the ecosystem facilitates for innovation is by arranging two types of activities, both to enable work on specific projects and additionally to create an arena for spontaneous interactions between the members. A different way is through sharing resources, such as data, which supports the theory on network resources (Lavie, 2006).

The innovation ecosystem literature highlights that the focus on the value proposition requires an ecosystem analysis to consider if there is a divergence of interests between members (Shipilov & Gawer, 2018). This thesis contributes by suggesting that the reasons for divergence of interest and expectations between members is not only related to their specific interdependencies, but also connected to their identities and motivations. These factors present challenges to the facilitation of innovation in the ecosystem.

Our findings suggest that the leader role in an ecosystem is more complex due to the aspect of competition, and that being the leader demands a significant amount of devoted resources such as time and financing, compared to the other members. The findings also provide insight on how leaders manage their position and commitment through the different stages of the ecosystem, suggesting that the roles will change as the ecosystem becomes more mature (Bogers et al., 2019). Our contribution, derived from our findings, is that the leader of the ecosystem in the emergence phase inhabits a significant position of power. The ecosystem is very dependent on the initiative of the leader and they decide the direction of the ecosystem to a great degree.

The members represent different firms with separate arrangements and company cultures, and the ecosystem's leaders do not have the necessary structural control to impose any specific arrangement to ensure that the members contribute the necessary time or resources. The lack of control can be a threat to the ecosystem's ability to facilitate for innovation, especially considering the importance of showing tangible results and progress before they lose momentum. The study contributes to existing literature by suggesting that in a less formalized constellation like an ecosystem, interpersonal traits like trust become essential for the coordination of members.

7.1 Limitations and future research

Limitations of the study includes the maturity of the ecosystem because the interviews took place just a year after the establishment of the ecosystem. This potentially implies that participants of the study may not have had enough time to reflect, and there might be a bias towards the positive status quo of the project. However, they have been operating for a year and all the informants reflected on both the current situation, the past and the future on their own initiative. We recommend that future research build on this by studying different phases

in ecosystems' development, which can both contribute to validate our findings further and expand upon them. The study is limited to a case study of a single ecosystem in Norway, which makes it context sensitive. Additionally, it was conducted in the time span of one semester which limited the scope of the case.

The ecosystem literature is lacking when it comes to specific operation and activities. This study suggests that the two types of activities hosted by the ecosystem creates arenas for cross-firm and -industry innovation projects. Future research should spotlight what effect the different activities have and what types of activities that are the most important in order to spark innovation in ecosystems.

7.2 Practical implications of the findings

This study highlighted an important practical implication by calling attention to the near-term results and progress for the success of the ecosystem. Many of the positive benefits and results might be difficult to showcase to the members, especially in the emergence phase of the ecosystems. Establishing a strong culture around the overarching vision and larger goals of the collaboration will be essential for the future success of the ecosystem. Regularly emphasizing the goals and vision is important to maintain the enthusiasm and motivation for the members, preferably implemented in combination with the efforts to manage the different expectations and interests.

While the ecosystem mindset seemed well established for the leaders in Proptech Innovation, it appeared less so for the rest of the informants. All the informants we talked to express an understanding for the potential and overarching goal, but the message of this being specific to ecosystem solutions was not always prominent, hence the mixing of the term ecosystem and cluster. In addition, the goal of gaining cluster status through Innovation Norway surely influenced how the informants communicated in the interviews. Moving forward, it is important that the short-term goal of achieving cluster status does not interfere with their long-term ambitions and the ecosystem mindset.

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9. APPENDIX

9.1 Appendix A - Consent form

Informasjonsskriv/samtykkeskjema - Norges Handelshøyskole

FOCUS-programmet er et samarbeid mellom Norges Handelshøyskole og norske bedrifter. Et mål med forskningsprogrammet er å utvikle kunnskap rundt temaene internasjonal integrasjon, dynamiske kontrollsystemer og endringskapasitet. Vårt forskningsprosjekt vil undersøke innovasjon og økosystemer.

Vi inviterer deg til å delta i et intervju som varer i 60 til 90 minutter. Det vil bli tatt lydopptak av intervjuene og notater vil bli tatt underveis. Intervjuet vil deretter bli transkribert. All informasjon som kan identifisere enkeltpersoner vil bli fjernet (slik som navn). Kun personer som deltar i intervjuene vil ha tilgang til materiale som kan identifisere informanter. Deltakelse i prosjektet er frivillig og du kan trekke deg når som helst uten å oppgi grunn. Etter prosjektets slutt vil innhentet materialet bli slettet. Alle informanter har rett til å klage til Datatilsynet.

Dataene vil bli brukt til forskning, dvs. produksjon av vitenskapelige artikler og rapporter. Ved å signere dette skjemaet samtykker du til å delta i studien. Dersom du har spørsmål angående denne invitasjonen eller ønsker å bli informert om resultatene av studien, ta gjerne kontakt gjennom informasjonen nedenfor.

Med vennlig hilsen

Lina Åsdahl   Kahni Ismail
lina.asdahl@student.nhh.no   Kahni.ismail@student.nhh.no

NHHs personvernombud
personvernombud@nhh.no
FOCUS Program, SNF
Dept. of Strategy and Management
Norges Handelshøyskole

Jeg har mottatt skriftlig informasjon og er villig til å ta del i forskningsprosjektet:

Signatur …………………………………. Telefon ………………………………

Fullt navn (i blokkbokstaver)…………………………………………………………

9.2 Appendix B - Interview guide

As detailed in the methodology section, an interview guide that changed somewhat depending on whether the informant was from RED or from Sharing is Caring was initially developed. Some questions were added to the guide after the initial interviews to reflect new information we wanted to explore further. They are included in the interview guide below.

Introduksjon

1.   Kan du fortelle litt om din rolle i bedriften/organisasjonen?

2.   Hva er din rolle denne arbeidsgruppen/samarbeidet?

3.   Hvordan ser innovasjonsarbeidet i din organisasjon ut?

4.   Har det endret seg mye fra tidligere?

5.   Har medlemskapet i økosystemet påvirket måten dere driver med innovasjon?

Økosystemet

1.   Hvorfor tror du at [RED] valgte å starte et økosystem?

2.   Hva er din oppfatning av et økosystem?

3.   Hva er viktig for å få det til å fungere?

4.   Hva motiverte dere til å bli med i økosystemet og denne arbeidsgruppen?

5.   Hvilken rolle har ditt selskap i økosystemet?

6.   Hva slags forventninger har dere til økosystemet?

7.   Hvilken verdi tror du økosystemet kan ha for dere?

8.   Hvilke fordeler tror du et økosystem kan gi på bransjenivå og utover?

9.   Hvilke utfordringer tror du økosystemet kan gi for dere?

    a.   For andre aktører?

10.   Hvilke utfordringer har dere møtt på så langt?

11.   Hvor viktig er den fysiske lokasjonen for økosystemet?

12.   Er det nødvendig med dagens teknologi å være i fysisk nærhet?

Innovasjon

1. Hvordan ser du sammenhengen mellom økosystem og innovasjon?

2. På hvilken måte kan dette økosystemet føre til innovasjon?

   a. Hvordan? Hvorfor?

3. Hvilken verdi tror du at økosystemet kan gi for innovasjonsmiljøene i Bergen?

4. Hvorfor velger dere å ta noe av innovasjonsarbeidet inn i dette samarbeidet?

5. Kan det være noen ulemper ved å legge innovasjonen til eksternt arbeid?

   a. Hvordan? Hvorfor?

6. Hva er de største forskjellene mellom å drive innovasjon internt i bedriften og gjennom et økosystem for dere?

7. Setter dere noen grenser på hvilke innovasjonsprosjekter dere vil gå inn i økosystemet med og hvilke dere vil holde utenfor?

   a. Eventuelt hva gjør at dere vil ta de med/holde utenfor?

8. Er det enkelte deler av en løsning eller innovative ideer dere ser for dere at dere vil holde internt i selskapet?

9. Hvor viktig er eierskap til innovasjonen?

10. Hvordan håndterer man eierskap til innovasjon i et økosystem?

11. Hvilke utfordringer kan oppstå når det kommer til datadeling?

    a. Hvordan? Hvorfor?

Styring og samarbeid

1. Skiller samarbeidet i økosystemet seg fra andre typer samarbeid?

   a. Hvordan? Hvorfor?

2. Hvordan syns du samarbeidet har fungert så langt?

   a. I økosystemet? I arbeidsgruppen?

3. Hva må medlemmene bringe med seg inn i samarbeidet for at økosystemet skal fungere på en optimal måte?

4. Hva føler du dere kan bringe til økosystemet?

    a. Hvorfor er dette viktig?

5. Har dere gjort noen forventningsavklaringer?

6. Føler du forventningene er møtt så langt?

7. Hvilke målsettinger har dere til samarbeidet?

8. Hvilke utfordringer kan oppstå i samarbeid i et økosystem, sammenlignet med internt samarbeid i en bedrift?

9. Hvordan er denne arbeidsgruppen styrt?

10. Hvordan velger dere hvem som skal være ansvarspersoner?

    a. Hvorfor er de det?

11. Hvilke styringsmidler er tilgjengelig for ansvarspersonene?

12. Har dere lært noe viktig som dere kan dele med andre bedrifter som ønsker å bli medlem av et økosystem