The Paradox of Openness in Open Innovation Among Large Organizations in the Finnish Bioeconomy

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ABSTRACT OF THE MASTER'S THESIS

Subject: International Business
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Title: The Paradox of Openness in Open Innovation Among Large Organizations in the Finnish Bioeconomy
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Abstract: In an increasingly competitive global business environment, innovation has become a matter of survival for organizations. Thus, today businesses are driven to find new ways to innovate. In the bioeconomy, there is a recognized need for multidisciplinary knowledge. To acquire this type of knowledge requires businesses to collaborate with stakeholders, not only within, but also outside their traditional sectors. Open innovation is a way of innovating collaboratively with external stakeholders. However, it is apparent that tensions between knowledge sharing, and knowledge protection arise when companies aspire to innovate collaboratively. This tension is also called the 'paradox of openness'. The aims of this thesis are threefold. The first aim is to build a theoretical understanding of challenges that organizations tend to face in open innovation environments. The second aim is to identify and describe challenges of incorporating external stakeholders in the context of open innovation in the Finnish bioeconomy sector. The fulfillment of these scientific aims contributes to a third normative aim, namely, to help accelerate open innovation in the Finnish bioeconomy. In this exploratory qualitative study, five semi-structured in-depth interviews were conducted with experienced personas working with research and development in

large Finnish organizations within the Bioeconomy sector. The responses were analyzed by using Grounded Theory to find plausible explanations for phenomena described by the respondents.

According to the respondents, the most typical challenges in open innovation are aspects regarding information sharing outside organizational boundaries, trust building, mutual commitment, resources, and financing models for joint research projects. After analyzing interviewee responses and earlier research, a new theorization called Openness Theory is presented in this thesis. A peculiar relationship between goodwill trust and openness is highlighted in this theory. The theory draws attention to the individual employees as rational decision makers within the organizations. It questions whether the incentives for the individual employees are aligned with their organization's visions of being more open toward its external stakeholders.

Keywords: The Paradox of Openness, Open Innovation, Collaboration, Trust, Knowledge Sharing, Openness Theory, Finnish Bioeconomy

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ABSTRAKT PÅ SVENSKA

Ämne: Internationell företagsverksamhet
Författare: Oliver Blomqvist
Titel: Öppenhetsparadoxen i öppen innovation bland stora organisationer i den finska bioekonomin
Handledare: Wilhelm Barner-Rasmussen
Abstrakt: I en alltmer konkurrensutsatt global affärsmiljö har innovation blivit en fråga om överlevnad för organisationer. Därför måste organisationer i dag hitta på nya sätt att skapa innovationer. Inom bioekonomin finns det ett erkänt behov av tvärvetenskaplig kunskap. För att skaffa denna typ av kunskap är organisationer ofta tvungna att samarbeta med intressenter utanför deras traditionella sektorer. Öppen innovation är ett sätt att skapa innovationer i samarbete med externa intressenter. Det är dock uppenbart att det uppstår spänningar mellan kunskapsdelning och behovet av att skydda kunskap när organisationer strävar efter att skapa innovationer tillsammans. Denna spänning kallas också för "öppenhetsparadoxen". Denna avhandling har tre mål. Det första målet är att bygga upp en teoretisk förståelse för de utmaningar som organisationer tenderar att möta i öppna innovationsmiljöer. Det andra målet är att identifiera och beskriva utmaningar med att inkorporera externa intressenter i samband med öppen innovation i den finska bioekonomisektorn. Att uppfylla dessa vetenskapliga mål bidrar till ett tredje normativt mål, nämligen att påskynda öppen innovation inom den finska bioekonomin. I denna explorativa och kvalitativa studie genomfördes fem semistrukturerade intervjuer med erfarna personer som arbetar med forskning och utveckling i stora organisationer inom den finska bioekonomisektorn. Svaren analyserades med hjälp av grundad teori för att hitta plausibla förklaringar till de fenomen som respondenterna beskrev.

Enligt respondenterna är de mest typiska utmaningarna inom öppen innovation aspekter som berör bland annat delande av information utanför organisationsgränserna, förtroendeskapande, ömsesidigt engagemang, resurser och finansieringsmodeller för gemensamma innovationsinitiativ. Genom att ta hänsyn till respondenternas svar, samt tidigare forskning, föreslås sammanfattningsvis en ny teori som kallas till öppenhetsteorin (eng. Openness Theory). Ett särskilt förhållande mellan förtroende och öppenhet lyfts fram i denna teori. Teorin uppmärksammar de enskilda arbetstagarna som rationella beslutsfattare inom organisationerna. Teorin ifrågasätter om incitamenten för de enskilda medarbetarna är i linje med organisationens visioner om att vara mer öppen gentemot sina externa intressenter.

Nyckelord: Öppenhetens paradox, öppen innovation, samarbete, tillit, delande av information, öppenhetsteorin, den finska bioekonomin

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1. Introduction

Today, innovation is not only considered to be a key to success, but also a matter of survival in an increasingly competitive global business environment (Lindemann & Boehmer, 2015; Abulrub & Lee, 2012). So called open innovation is essentially innovation across organizational boundaries (Chesbrough & Bogers, 2014). Along with the increasing global competition, there is not only an emerging need for innovation, but also a need for knowledge protection (Hou & Wang, 2020).

The context of the study is the Finnish bioeconomy. According to the European Commission, the bioeconomy includes the following sectors: "primary production, such as agriculture, forestry, fisheries and aquaculture, and industries using / processing biological resources, such as the food and pulp and paper industries and parts of the chemical, biotechnological and energy industries." (European Commission, 2021)

In the bioeconomy, there is a recognized need for multidisciplinary knowledge (Van Lancker, Wauters & Van Huylenbroeck, 2016; Näyhä, 2020). Additionally, in the bioeconomy radically new and disruptive innovations will be needed (Van Lancker et al., 2016; Lovrić, Lovrić & Mavsar, 2020).

According to the findings of Näyhä (2020), the Finnish forest-based sector, which is a sub-sector within the Finnish bioeconomy, needs more attention when it comes to information sharing and genuine collaboration, because of a lack of trust and overly cautious attitudes between actors within the sector. Ultimately, Näyhä (2020) encourages openness and collaboration between companies. Based on previous findings, this thesis continues to explore the perceived challenges regarding trust, commitment and openness in open innovation within the context of the Finnish bioeconomy.

1.1 Problematization

On the one hand, earlier research has emphasized that there is an increased need for interorganizational collaboration as well as open innovation (Chesbrough, 2003). On the other hand, earlier scientific findings suggest that a tension between openness and knowledge protection commonly occurs in collaborative innovation efforts. (Paasi et al., 2020; Laursen & Salter, 2014)

In open innovation, a typical type of challenge is 'the paradox of openness', which refers to the tension between openness and knowledge protection (Laursen & Salter, 2014). In open innovation, the tension can be paradoxical, because on the one hand, open innovation requires a certain amount of openness, but on the other hand, firms need to reap profits from their innovation investments (Laursen & Salter, 2014). The paradox of openness appears to be prevalent in innovation ecosystems in multiple different sectors, including the Finnish bioeconomy sector (Paasi et al., 2020).

Another challenge that can occur in open innovation is the prisoner's dilemma. This dilemma occurs when two actors attempt to cooperate, but the uncertain circumstances lead to higher incentives to defect. In this case, the environment for cooperation is not ideal. In an environment where the prisoner's dilemma is repeated with a higher probability, it is better to cooperate. (Yun, 2014) It is therefore relevant to question whether the operational environment supports a long-term perspective.

Trust, openness and transparency, amongst others, are preconditions for successful open innovation practices (Westergren & Holmström, 2012; Chesbrough, 2003). Similarly, trust and openness are one of the most common core values in Finnish corporate culture (Panapanaan et al., 2003).

Many of the organizations in the Finnish bioeconomy have publicly stated that 'trust' or 'trustworthiness' is one of their core values. The Finnish organizations in focus of this thesis operate and/or have other stakeholders in other Nordic countries as well, where the core values also are trust, openness and transparency (Robinson, 2020). Although the cultural values match the preconditions of open innovation, the paradox of openness

seems, according to literature, to be a big challenge in the Finnish bioeconomy (Näyhä, 2020). What if Finnish organizations could further improve their current open innovation practices by integrating values that are already embedded in the culture?

1.2 Definitions

Some of the terms used in this thesis could be interpreted differently. Hereby, some definitions of these terms are provided:

Open Innovation

Henry Chesbrough**,** the originator of the term 'open innovation' has defined it as follows:

> "Open innovation is a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with each organization's business model. These flows of knowledge may involve knowledge inflows to the focal organization (leveraging external knowledge sources through internal processes), knowledge outflows from a focal organization (leveraging internal knowledge through external commercialization processes) or both (coupling external knowledge sources and commercialization activities)" (Chesbrough and Bogers, 2014).

The Bioeconomy

The European commission defines the term 'the bioeconomy' as follows:

> "The bioeconomy means using renewable biological resources from land and sea, like crops, forests, fish, animals and micro-organisms to produce food, materials and energy" ("Bioeconomy", 2021).

Large Organization

In this study, the term ‘large organizations’ refers to organizations with over 1000 employees.

1.3 Aims of the Study

As already mentioned, there is an increasing need for transdisciplinary knowledge in the bioeconomy, which in turn increases the need for collaborative innovation efforts, and the typical challenges and preconditions of open innovation involve trust, transparency, and openness. Nordic common values are trust, transparency, and openness (Robinson, 2020). It is therefore arguable that the Finnish businesses have an opportunity to integrate these values into interorganizational practices, particularly in Finland and the Nordic Area.

In this exploratory thesis, the aims are threefold. The first aim is to build a theoretical understanding of challenges that organizations tend to face in open innovation environments. The second aim is to identify and describe challenges of incorporating external stakeholders in the context of open innovation in the Finnish bioeconomy sector. The fulfillment of these scientific aims contributes to a third normative aim, namely, to help accelerate open innovation in the Finnish bioeconomy by providing a new theorization that is grounded in earlier research and the results of this thesis.

1.4 Research Questions

In order to reach the aims of this study, the following research questions are set:

Primary research question:

i) What are the perceived challenges in open innovation within large organizations operating in the Finnish bioeconomy?

Secondary research question:

ii) What can organizations do to promote open innovation with external stakeholders?

1.5 Delimitations

This study focuses only on large organizations in the Finnish bioeconomy. The research method of this study has its delimitations. The sample size is relatively small as only five people were interviewed. The research approach was abductive, which also means that the end results only provide plausible explanations to different situations. Within the scope of this study, it is thereby not possible to verify the theories and the results.

Although many details of the empirical results of this study may be industry specific, the theory that is built based on the results is meant to be generalizable and could therefore be applied to other industries and geographical areas.

1.6 Structure of the Thesis

The structure of the thesis is the following. In Chapter 1, the background of the thesis, the problematization and the research aims are presented. The chapter also includes the research questions, definitions of terms, and the delimitations of the study. Chapter 2 is the literature review, which includes relevant literature that has been used in the study. The concepts of open innovation and its relation to the prisoner's dilemma and the paradox of openness are explained. In this chapter, the relevance of the context of the study, the bioeconomy in Finland, is also motivated. In Chapter 3, the methodology is presented. The research approach, the method for data collection and the philosophical underpinnings of this thesis are explained. In Chapter 4, the results of the semi-structured interviews are presented. The responses are collected and combined into core topics that

respondents have emphasized during the interviews. Chapter 5 is a conclusion and a discussion. In this final chapter, the results are ultimately linked to the research aim and questions, as well as the results of previous studies. Furthermore, a new theory called Openness Theory is proposed. The Openness Theory is grounded in the empirical data of this study, as well as in earlier research. Chapter 6 is a Swedish summary of the thesis.

2. Literature Review

The key context of this study is open innovation in the Finnish bioeconomy. This chapter provides background information about the key concepts.

2.1 Open Innovation

In business literature it is commonly stated that innovation is a key to success (Grönlund et al., 2010). Some business leaders, professors and other experts go even further by using the dictum "Innovate or die!" (Getz & Robinson, 2003). In other words, innovation is seen as a precondition for businesses to differentiate themselves from other businesses in competitive industries (Lindemann & Boehmer, 2015). It is sometimes not only seen as a matter of business success, but also as a matter of survival. In innovation theory it is commonly known that ideas can be generated outside the organizational boundaries (Lindemann & Boehmer, 2015). In 2003, Henry W. Chesborough, an organizational theorist and business management professor, coined the term "open innovation" for the first time in his book *Open Innovation The New Imperative for Creating and Profiting from Technology* (Chesbrough, 2003). Since then, the era of open innovation has emerged along with increased globalization. The concept has since its beginning received increased scholarly and managerial attention (Chesbrough & Bogers, 2014). According to the results of a study, conducted by Abulrub and Lee (2012), globalization is a main driver of open innovation.

In this thesis, the terms "open innovation" or "collaborative innovation efforts" refer to the definition of open innovation provided by Chesbrough and Bogers (2014). The definitions are stated in chapter 1.3. To gain perspective of what makes open innovation different, I want to lay out how another more traditional view of innovation looks like. In Figure 1, the closed innovation process is illustrated. According to this traditional view, the projects can enter and exit the process only in one way. The closed innovation process typically starts from the company's internal research department and with time some

projects are selected to be developed further. The selection process continues until a few products or services ultimately reach the market. (Chesbrough, 2012)

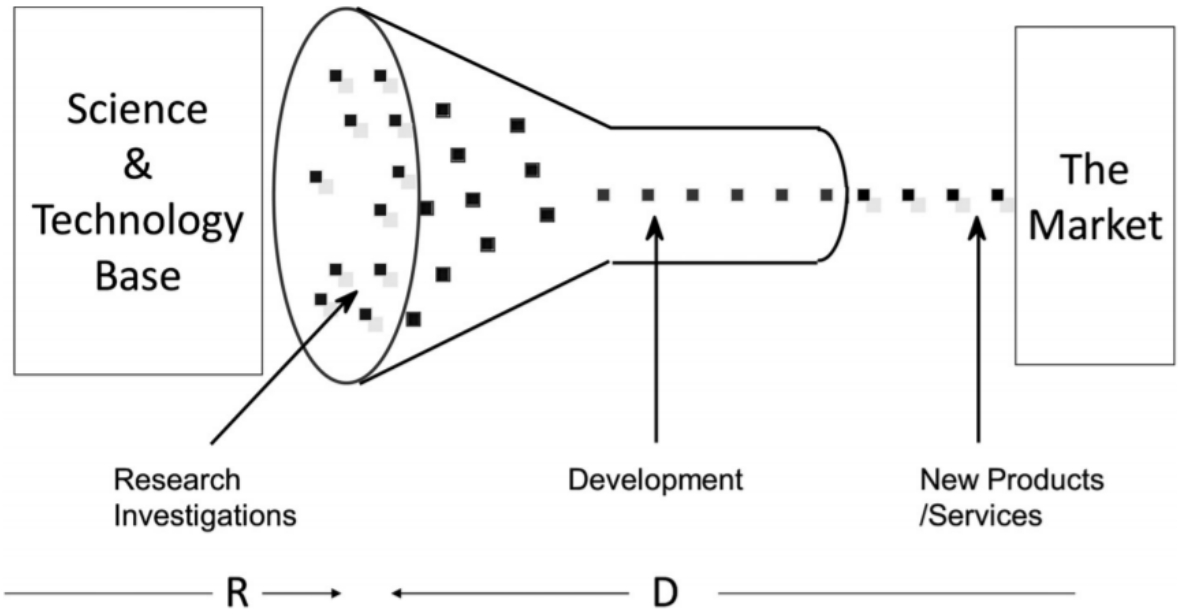

Figure 1 A Closed Innoation System (Chesbrough, 2012)

In Figure 2, The Open Innovation Model by Chesbrough (2012) is presented. The name of the model is self-explanatory in relation to Closed Innovation. The innovation process is more open than the closed innovation process. There can be several different outcomes and innovation input can origin from external stakeholders. The process in open innovation is thus less linear than the closed innovation process. (Chesbrough, 2012)

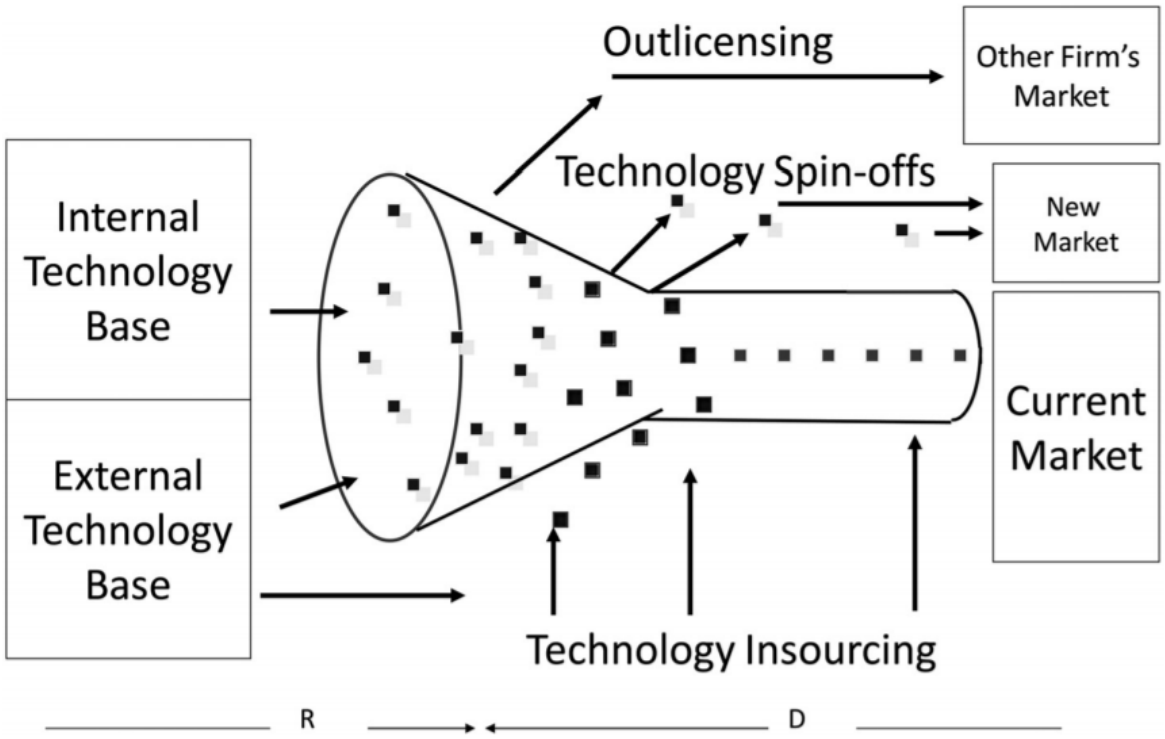

Figure 2 . The Open Innovation Model (Chesbrough, 2012)

Innovation processes are commonly facilitated by business ecosystems. According to literature, business ecosystems make information more accessible for companies that are involved, and that the innovation output thereby increases. (Borgh, Cloodt & Romme, 2012)

In natural sciences, an 'ecosystem' refers to a community in which living organisms interact with one another as a system in a specific area. In this system various interdependencies between organisms exist. Instead of focusing on independent organisms, one shall pay attention to how the organisms are related to one another in order to understand the dynamics of the ecosystem (Lahtinen et al., 2016). Based on literature, consensus over a definition of innovation ecosystems cannot be found (Lindemann & Boehmer, 2015).

In a conceptual review (Granstrand & Holgersson, 2020), multiple different definitions about what an innovation ecosystem is, were compared and analyzed. Based on earlier

definitions, they came up with the following definition, which is also the definition of an ecosystem I will refer to throughout this thesis:

> "An innovation ecosystem is the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors." (Granstrand and Holgersson, 2020)

2.2 The Role of Trust in Open Innovation

As indicated earlier, trust is of considerable importance in open innovation. According to Westergren & Holmström (2012), mutual trust is a precondition for knowledge sharing across organizational boundaries.

Higher levels of trust strengthen open innovation culture and provides freedom to act under uncertain circumstances. Relationship-based trust allows actors to act and exchange knowledge more flexibly than formal contracts. (Nestle et al., 2019) It has also been demonstrated that increased trust between collaborating partners can increase the sharing of knowledge. Moreover, trust can boost the level of knowledge tacitness, which in turn has potential benefits for the innovation procedures. (Nielsen & Nielsen, 2009) Another study about innovation research, conducted by Ghazinejad, Hussein and Zidane (2018), concluded that increased trust promotes collaboration, interdependencies, and knowledge exchange, while reducing control. Mutual trust leads to higher performance and increased efficiency.

Although trust is arguably useful in open innovation initiatives, it comes with a cost. It can take a long time to build but can easily be broken. (Nestle et al., 2019) There are two types of risks associated with interorganizational collaboration: performance risk and relational risk. Performance risk has to do with the capabilities of a collaborating partner. If the capabilities of the partner are low there is a performance risk, despite the good intentions of a partner. The other type of risk, relational risk, has to do with the intentions of a partner. A relational risk arises when a partner has other interests and is potentially

incentivized to pursue opportunistic behaviors. A relational risk can be present even though a partner in question is fully capable of meeting the expectations of the collaborative efforts. Similarly, trust can be divided into two dimensions. The type of trust that is needed while dealing with performance risk is called competence trust. For relational risk, the associated type of trust is called goodwill trust. (Das & Teng, 2001)

In relation to the importance of the matter, only a few scientific explanations can be found about the role of trust in open innovation environments (Nestle et al., 2019). Westergren and Holmström (2012) found that by making efforts to maintain trust, companies can mitigate involved risks, such as opportunistic behaviors. So far, one of the more concrete solutions to the "problem" of trust is to include trusted intermediaries. Intermediaries, such as ecosystem facilitators, have thereby gained importance in collaborative innovation efforts. Trusted third party organizations can increase the rate of success in open innovation initiatives (Abu El-Ella, Bessant & Pinkwart, 2015).

2.3 The Paradox of Openness

If innovation is a precondition for the survival of a business and if there is an increased need for collaborative innovation efforts or open innovation, it is relevant to understand the preconditions for open innovation.

By nature, commercial research efforts are mostly made to gain a competitive advantage. As global commercial competition increases, matters such as opportunism, market share and sometimes political influence become even more relevant. Consequently, it becomes even more relevant for businesses to protect their intellectual property (Hou & Wang, 2020). For example, if an organization operates in fields such as "aerospace, biotechnologies, chemicals, communications, computer, electronics, nuclear energy, oil and gas, or environmental industries" it is more likely to become a victim of competitive intelligence and industrial espionage" (Wright & Roy, 1999).

As previously mentioned, companies often need to collaborate with many different organizations in order to innovate. Simultaneously, there must be a way to capture value and returns of these innovative practices. In other words, openness, in terms of knowledge sharing, is a precondition for open innovation, meanwhile some level of protection is required for the commercialization phase. This contradiction between value creation and value capture is called 'the paradox of openness'. (Laursen & Salter, 2014)

A study conducted by Paasi et al. (2020) is about the paradox of openness in the context of open innovation ecosystems. Among other things, the study reminded us that intellectual property rights and contracting are relevant in open innovation ecosystems. However, as the ecosystem might include unknown actors the realization of such legally binding contracts is more difficult. In this study, several actors from 13 different ecosystems from various sectors were interviewed. According to the findings, the facilitators of open innovation ecosystems usually do not take part in knowledge management. The facilitators are usually expected to provide impartial support and to keep confidentiality. In contrast to other networks, where contractual agreements might be the norm, in an open innovation ecosystem trust is an even more vital factor. Instead of focusing on legally binding agreements, ecosystemic innovation shall be an environment that encourages knowledge sharing and openness. Furthermore, the same study found that one of the biggest challenges in open innovation ecosystems is how involved actors can share knowledge openly with actors they neither know nor trust.

Another typical challenge is the imbalance in pro-activeness of ecosystem participants. Some participants may take on a more active role while others may remain passive. Although the authors of the study indicated that its conclusions shall only be considered to be indicative rather than as generalizable facts, they still concluded that the paradox of openness seems to be a challenge in open innovation ecosystems. (Paasi et al., 2020)

2.4 Managing the Paradox of Openness

When presenting the paradox of openness, it is also relevant to present how previous research has found ways of managing it. Ritala and Stefan (2021), suggests that there is a knowledge leveraging paradox within the paradox of openness. It is argued that the problems that the paradox of openness gives rise to can be alleviated by acknowledging and managing the knowledge leveraging paradox. The knowledge leveraging paradox has to do with two tensions that arise when organizations seek to capture and create value. While creating value a transferability tension can arise due to knowledge tacitness. An exposure tension arises due to knowledge codifiability while capturing knowledge. Codified knowledge is explicit and therefore easy to imitate and transfer, whereas tacit knowledge is implicit and more difficult to imitate and transfer. Figure 3 is a representation of how the knowledge leveraging paradox is related to the paradox of openness. Academic literature suggests that a way of managing the knowledge leveraging paradox, and thereby the paradox of openness as well, is to create separation and restructuring mechanisms. (Ritala and Stefan, 2021; Gast et al., 2019)

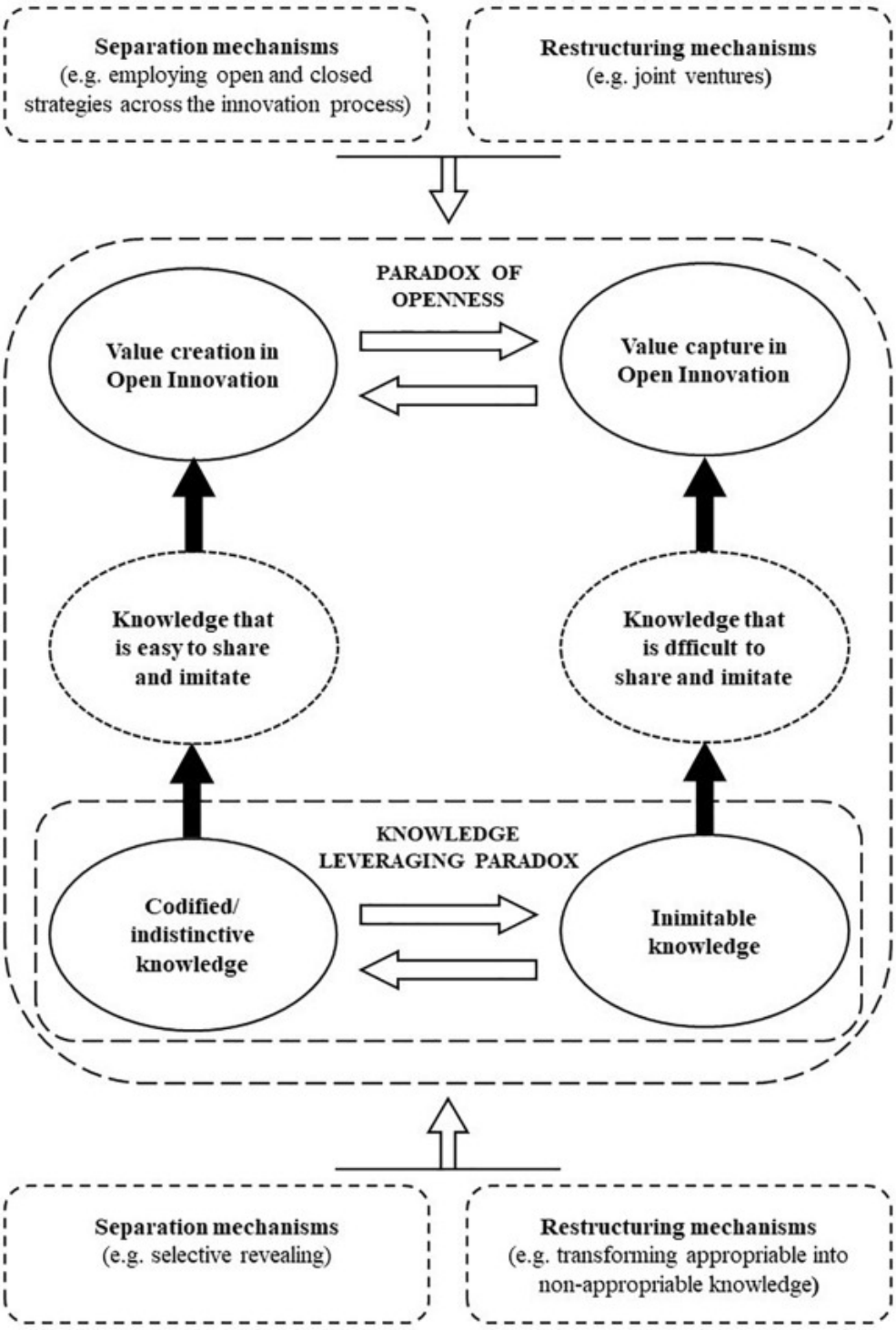

Figure 3 A paradox within a paradox in open innovation: mechanisms of separation and restructuring for addressing tensions in embedded paradoxes (Ritala & Stefan, 2021)

Separation mechanisms involve deliberate distinctions between tacit and codified knowledge (Ritala & Stefan, 2021). Firms tend to be more willing to share general

knowledge than specific knowledge. Distinguishing the types of knowledge may be valuable because specific knowledge can be more vital for the creation and continuation of a competitive edge (Gast et. al., 2019). One type of separation mechanism is called selective revealing. According to Foege et. al. (2019), selective revealing is to disclose relevant intellectual property only partially without the need to have a formal contractual agreement. The selective revealing is a type of separation mechanism because of the compartmentalization of information. Selective revealing can alleviate tensions in both the knowledge leveraging paradox and the paradox of openness. (Ritala & Stefan, 2021) According to Foege et al. (2019), selective revealing is "mainly suited for complex and modular solutions". Other separation mechanisms include for example open-and-closed strategies, which is about strategically being open and closed during certain phases of the innovation process (Appleyard & Chesbrough, 2017).

Restructuring mechanisms is another way of managing the paradoxical tensions that emerge in open innovation. These mechanisms typically include patents and non-disclosure agreements (Ritala & Stefan, 2021). Another common restructuring mechanism is to create joint ventures to avoid conflicts of interest (Oxley & Sampson, 2004). Ritala and Stefan (2021) proposed that strategic implementation of restructuring mechanisms would reduce tensions that appear in the knowledge leveraging paradox and that the attainment of both value capture and value creation would improve. As presented in Figure 3, the separation and restructuring mechanisms, shown in the upper part of the figure, are mainly solving the paradox of openness and the same mechanisms, shown in the lower part, are corresponding examples of mechanisms that can solve the knowledge leveraging paradox.

2.5 The Prisoner's Dilemma in Open Innovation

According to Yun (2014), interorganizational collaboration in open innovation can be elaborated on from a game theoretical perspective. Innovative collaboration efforts between two organizations can typically lead to a problematic situation called 'the

prisoner's dilemma'. Figure 4 is a modified representation of figures 1 and 3 in the article of Yun (2014).

In the typical prisoner's dilemma there are two players, who in this case represent organizations. Each player has the possibility to defect or cooperate. The dilemma arises when the more rational option for both players is defection. The values that are used in literature in prisoner's dilemma are typically (R, T, P, S) These letters stand for 'Reward', 'Temptation to defect', 'Punishment' and 'Sucker's payoff' (Fort, 2003). As presented in Figure 4, the reward for each player is greater when they choose to defect, T=5 points, than cooperate, R=3 points. If one chooses to defect, the naive collaborator will earn S=0 and the defector earns T=5. Thus, both players are incentivized to choose defection when played once and both players earn only P=1 point each, instead of R=3 points, that would have been the result when both would have chosen to cooperate. In this case, cooperation ends, and a Nash equilibrium (P, P) is formed. Defection would be the rational choice in a one-shot game where circumstances for further collaboration are uncertain. Also, the reason why this happens is that the intentions of the other player remain unknown. In uncertain circumstances it is better to choose defection because the alternative outcomes of defection are 5 or 1 which is higher than the alternative outcomes of cooperation 3 or 0. (Yun, 2014; Press & Dyson 2012)

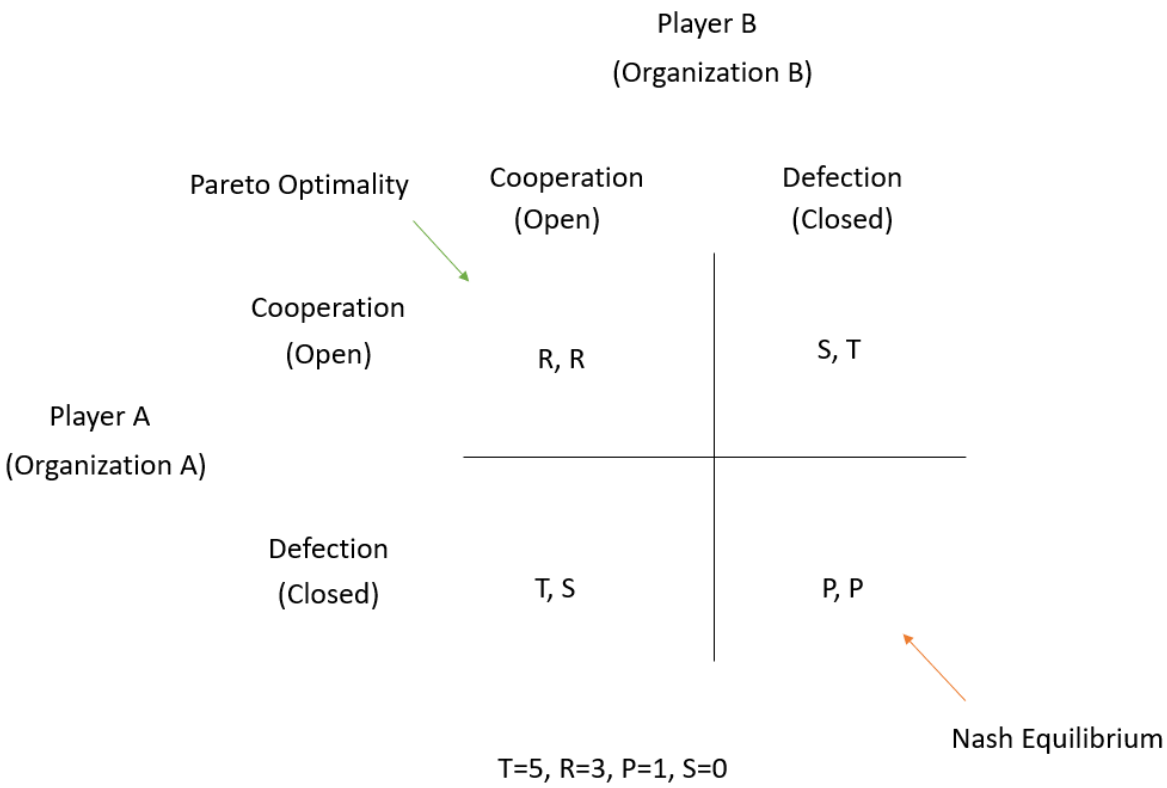

Figure 4 Prisoner's dilemma in the context of open innovation

In theory, however, if the participating players know that the game is to be infinite the more rational option for both parties is to cooperate, which is when the desired outcome, pareto optimality (R, R), can be reached. In other words, an environment, where the prisoner's dilemma is repeated with a higher probability, is better for cooperation. Thus, a high probability that players will play again will lead to a higher probability of both players being cooperative. Therefore, a basic assumption is that repetitiveness and reciprocity in the players' relationship will increase when there is a long-term perspective, where the players are expected to meet again. (Yun, 2014; Press & Dyson)

As mentioned, the prisoner's dilemma can be linked to open innovation. In that case 'cooperation' would translate to an 'open' strategy where information is shared and likewise 'defection' to a 'closed' strategy where information is protected. According to this theory, a long-term perspective will have a positive influence on mutual openness of collaborating organizations. To reach a long-term perspective a high probability of players (organizations) meeting again should exist, because they in that case are less likely to pursue opportunistic behavior that might hurt the other player (organization).

Similarly, lower probabilities of continued cooperation might predict defection of another party. (Yun, 2014)

2.6 The Bioeconomy in Finland and the Nordic Area

The chosen context of this study is the Finnish bioeconomy. According to the European Commission, the term "The bioeconomy" is defined in the following way:

> "The bioeconomy means using renewable biological resources from land and sea, like crops, forests, fish, animals and micro-organisms to produce food, materials and energy" ("Bioeconomy", 2021).

Furthermore, the European Commission has concisely motivated the need for a development of a bioeconomy as follows:

> "Stronger development of the bioeconomy will help the EU accelerate progress towards a circular and low-carbon economy. It will help modernise and strengthen the EU industrial base, creating new value chains and greener, more cost-effective industrial processes, while protecting biodiversity and the environment" ("Bioeconomy", 2021).

Although the scope of this study is geographically limited to the Finnish bioeconomy, the Nordic perspective is highlighted as well, because none of the interviewed organizations is strictly limiting its operations in the Finnish market. Many of the interviewed organizations operate in or directly compete with other organizations in other Nordic countries. Furthermore, the inclusion of the Nordic perspective can be motivated by the potential collaborative innovation efforts between Nordic organizations that could be done in the future. Namely, a report made by the Nordic Council of Ministers (2020) stresses the importance of making collaborative efforts to form a more complete and functioning bioeconomy. To maximize the utilization and value creation of the natural resources synergistic clusters are needed. In order to build such clusters, attention towards the collaboration between the public and private sector is needed.

Regarding the bioeconomy, the Nordic Region stands in an advantageous position. The Nordic countries are not only in the forefront of technological development, but also each

country has its own particular strengths with regards to natural resources and renewable energy. (Nordic Council of Ministers, 2020) In 2020, the forest industry and the chemical industry together stood for 36.4 percent of Finnish exports (Trade, 2021). Norway, Finland and Sweden are among the most densely forested European countries, and together all the Nordic countries have approximately 20 percent of the wood in Europe (Lundmark & Hannerz, 2017). To put that percentage into perspective, it is important to recognize that the Nordic population is 26 million and thereby only accounts for ca. 3.5 percent of the European total population ("Nordic Countries 2021", 2021; "Population of Europe (2021)", 2021). Moreover, Iceland and Norway have large marine environments and Denmark has its particularly fertile agricultural soils. Typical renewable energy sources in the Nordic Region include wind energy, hydropower, biomass energy, including Iceland with geothermal energy. (Nordic Council of Ministers, 2020)

2.7 Open Innovation in The Bioeconomy

In a study by Van Lancker et al. (2016), important factors that impact innovation management in the context of bioeconomy were identified. In brief, the key impact factors were that radically new and disruptive innovations will be needed. Lovrić et al. (2020) also support this claim. Especially current business models and ways of interorganizational collaboration that require attention. These radical changes will require a more complex base of knowledge. Areas such as “life sciences, agronomy, ecology, food science, social science, biotechnology, nanotechnology, information and communication technologies (ICT) and engineering” (Van Lancker et al., 2016) will be relevant in innovation practices in the bioeconomy. Therefore, knowledge and technology from various scientific fields will be needed (Van Lancker et al., 2016). In order to obtain all this knowledge and technology interorganizational collaboration is needed. Openness to collaboration with different stakeholders is required to reach these goals. Stakeholders may be divided into categories such as policy makers, competitors, organizations from previously unrelated industries, universities and research institutes, suppliers, users and customers, other actors in the value chain and consultants. (Van Lancker et al., 2016)

Supporting findings have been made in other studies as well. Näyhä (2020), conducted a study about the Finnish forest-based sector's role in the circular bioeconomy included several findings related to the interactions of companies. Several semi-structured thematic interviews were made with company executives and managers from different companies, all operating within the Finnish forest-based sector. The respondents had emphasized that Finnish companies tend to be cautious when it comes to sharing ideas outside their organizational boundaries. Although many ecosystems are already established, there is still a lack of genuine aspiration to cooperate. Among the respondents, there was also a recognized need for interorganizational teams that can coordinate innovative practices. The study finally concluded with some recommendations for both large and smaller-scale companies. Among other things, the recommendations shed light on the importance of keeping an open dialogue with various stakeholders and interorganizational collaboration. Van Lancker et al. (2016) additionally stressed the importance of implementing "feedback loops" between the different phases during the innovative processes. In other words, innovation should be an iterative process rather than a linear one.

The findings of the study conducted by Näyhä (2020) suggested that in the Finnish forest-based sector a positive correlation between innovation openness and success exists. It was, however, also noted that the lack of trust between organizations in the Finnish forest-based sector is challenging. To manage the challenge, open information sharing and collaboration between actors should be more prevalent. Therefore, these issues should be given more attention in the future.

Another challenge that has been recognized in the bioeconomy sector is that commercialization and adoption of technologies can be a challenge in the highly transient bioeconomy. The complex policy schemes are an additional challenge that organizations shall keep in mind. In addition to regulations regarding climate change, there can be many other regulations from different administrational levels. (Van Lancker et al., 2016)

2.8 Implications for Empirical Research

In the bioeconomy, multidisciplinary knowledge, as well as radically new and disruptive innovations will be needed, because of the increasingly competitive global business environment (Näyhä, 2020; Van Lancker et al., 2016; Lovrić et al., 2020; Lindemann & Boehmer, 2015; Abulrub & Lee, 2012). Open innovation is a way for organizations to gather knowledge outside organizational boundaries and to include external stakeholders in innovation processes (Chesbrough & Bogers, 2014). Open innovation and collaboration requiring mutual trust between partners is therefore needed if both parties want to gain maximum benefit. However, finding the balance between sharing information and keeping information private is perceived challenging. Challenges especially rise when organizations lack trust and are thereby unwilling to share knowledge. The prisoner's dilemma and the paradox of openness are hereby relevant theoretical aspects that are highlighted in this thesis.

According to earlier research, there is a lack of trust and overly cautious attitudes between actors within the forest-based sector, a large part of the Finnish bioeconomy (Näyhä, 2020). In addition, the paradox of openness appears to be a common challenge in several innovation ecosystems (Paasi et al., 2020). Simultaneously, organizations in the Finnish bioeconomy often publicly state that trust and trustworthiness are one of their core values. Based on these findings, it is relevant to ask: i) What are the perceived challenges in open innovation within large organizations operating in the Finnish bioeconomy? and ii) What can organizations do to promote open innovation with external stakeholders? By considering previous research and by interviewing experts in the field it can be possible to come closer to plausible answers to these questions. The method for finding an answer to these questions is more closely elaborated on in the following chapter.

3. Methodology

The chosen method for the research process in this thesis is based on Abductive Grounded Theory. Abductive Grounded Theory is based on the concepts of Abductive Reasoning and Grounded Theory (Rahmani & Leifels, 2018). These concepts will be clarified in this chapter. In this qualitative study, primary data will be collected through semi-structured interviews. The sampling method is expert sampling which is a type of purposive sampling. The analysis method is thematic content analysis. In this chapter the elements of the chosen research methodology, including its philosophical underpinnings, are explained, and justified.

3.1 Research Paradigm

The research philosophy indicates what assumptions the researcher has about knowledge creation (Research Philosophy., n.d.). The whole research process is underpinned by the researcher's philosophy (Saunders et al., 2019). This study is conducted from a pragmatist-critical realist viewpoint, which is a combination of critical realism and pragmatism. In this section the philosophical underpinnings of this study are briefly portrayed.

3.1.1 Critical Realism

One of the philosophical lenses of this study is critical realism. Instead of trying to explain the world in a positivist manner, critical realism pays attention to finding fundamental mechanisms with enduring properties that shape perceptible phenomena. The ontological assumption that characterizes critical realism is that the nature of reality is stratified, meaning that the reality is existing independently outside the researchers' observational realm. (Saunders et al., 2019, p. 147)

Bhaskar (2008), the originator of critical realism, argues that there is a distinction between fundamental mechanisms and patterns of phenomena that they give rise to. Similarly, there is a distinction between these phenomena and the experiences from which one is able to gather empirical material. Thus, gathered empirical material represents only some manifestations of reality (Saunders et al., 2019). According to this paradigm, there are three domains of reality: the real, the actual and the empirical domain. The three domains of reality overlap each other in the way that the empirical exists in the actual and the real, and that the actual exists in the real. From the perspective of critical realism, the overlapping does not work the other way around. In other words, the real cannot always be described by the actual in the way that the actual cannot be described by the empirical (Bhaskar, 2008).

The epistemological stance of the philosophical paradigm of critical realism highlights that knowledge is a socially assembled product based on past observations (Bhaskar, 2008). This lightly subjectivistic viewpoint (Saunders et al., 2019) highlights that knowledge is ephemeral and develops over time. Epistemology based on these assumptions is called epistemological relativism (Bhaskar, 2008).

The axiological position of critical realism is related to its epistemological position. As knowledge is a social construct, a researcher shall take socio-cultural backgrounds and individual experiences into account during the research process. By recognizing how these factors might influence the research process, it is possible to stay as objective as possible (Saunders et al., 2019).

3.1.2 Pragmatism

Another paradigm that is used in this research is pragmatism. This paradigm is practically oriented, and it is about searching problems in order to find practical solutions. In pragmatism, there is no fixed epistemological position (Khin & Fui, 2012). Pragmatism is about seeing concepts, ideas and theories as practical tools to solve real-world problems, while disregarding any abstract forms of them. Reality is what matters and knowledge is valued for its usefulness to solve concrete problems. This paradigm is also

very context specific and does thereby not seek for generalizable results. (Saunders et al., 2019)

3.1.3 Pragmatist-Critical Realism

It has been argued that pragmatism and critical realism are commensurable. The combination of these two philosophical paradigms is called Pragmatist-Critical Realism. This type of combination takes the ontological, epistemological, and axiological stance of critical realism, while adapting the practically oriented focus of pragmatism. Thus, a pragmatist methodology can add value to critical realism. (Heeks et al., 2019)

3.2 Research Approach and Method

The research approach is abductive, and the chosen research strategy is Abductive Grounded Theory. The concepts Grounded Theory and Abductive Reasoning are explicated separately in order to make the Abductive Grounded Theory easier to digest.

3.2.1 Abductive Reasoning

While using a critical realist paradigm, the research approach is typically abductive (Saunders et al., 2019, p.144). Abduction, sometimes called retroduction, is a type of inference that is used in pragmatism (Richardson & Kramer, 2006). The term ‘abduction’ was first coined by C.S.Peirce, who is also known as the originator of pragmatism, according to Richardson and Kramer (2006). While using abduction as a research approach, the researcher focuses on finding explanations for observed empirical data (Richardson and Kramer, 2006). Data is collected for exploratory purposes while using this approach. Abduction is about identifying recurring themes and patterns and categorizing them into a conceptual framework that can later be tested. This approach can

be used to modify existing theories and concepts or to generate new ones. In the process it is customary to incorporate already existing theories (Saunders et al., 2019).

In the abductive approach the aim is to give plausible theories to ‘surprising facts’ that have been observed at any time during the research process (Saunders et al., 2019). The plausible theories for the phenomena can further help the researcher to discover more surprising facts. These theories can at a later stage be tested by using inductive and deductive methods (Van Maanen et al., 2007). In modern literature, abduction is used to justify hypotheses and is commonly referred to as an “inference to the best explanation” (Douven, 2017).

3.2.2 Grounded Theory

Grounded Theory is a qualitative research method. There are two major features that distinguish grounded theory from other forms of research. Firstly, in contrast to deductive research methods where the theory is chosen prior to the collection of primary data, the theoretical concepts derive from the data that is collected during the research process. Secondly, the interrelation of data collection and data analysis is unique to this method. The data is first collected and analyzed. After the analysis, new questions and concepts can arise, and the process can be repeated. This creates a cyclical process between data collection, data analysis and theoretical concepts, as demonstrated in Figure 5. (Strauss & Corbin, 2015. pp.6-8.)

Figure 5 Interrelation Between Data Collection and Analysis (Strauss & Corbin, 2015, pp.6-8.)

3.2.3 Abductive Grounded Theory

Abductive Grounded Theory can be viewed as a combination of abductive reasoning and Grounded Theory (Rahmani & Leifels, 2018). As can be seen in Figure 6, the process starts with "Sensitizing Concept". Although the process starts on the left side and ends on the right side, as pictured in the model in Figure 6, all the steps in between can be revisited. As illustrated, it is an iterative process of background research and the development of research questions. After a substantive search of secondary data, the collection of primary data begins (Rahmani & Leifels, 2018).

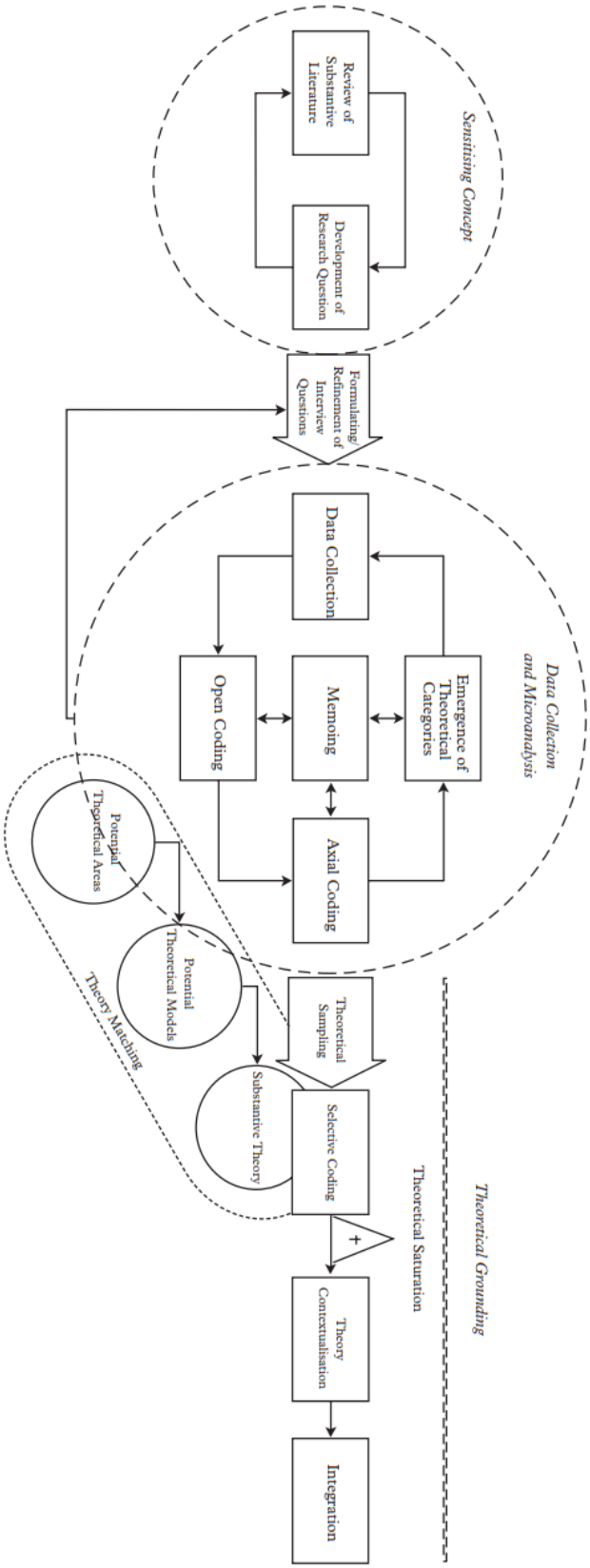

Figure 6 Abductive Grounded Theory Process (Rahmani & Leifels, 2018)

The original Straussian Grounded Theory contains a coding process that has the following stages: *open coding, axial coding* and *selective coding* (Strauss & Corbin, 2015). The details about the coding process are explained in the following chapters (see p. 33-35) During the coding process, the researcher is constantly 'memoing'. Memos are personal notes about peculiarities that the research does throughout the whole coding process. Memoing is therefore placed in the center of the model. (Rahmani & Leifels, 2018) The Straussian Grounded Theory argues that inductive reasoning should be followed by deduction and verification (Strauss & Corbin, 2015). While still incorporating the same coding process as in the Straussian version, the Abductive Grounded Theory is characterized by abduction, which as previously mentioned, is about "inference to the best explanation" (Douven, 2017) (Rahmani & Leifels, 2018). In other words, Abductive Grounded Theory does not attempt to verify the studied data. Abductive reasoning and theory matching is present throughout the whole process. Even the research question can change in the middle of the process. In the model, this is represented by the arrow that loops back from the middle to the stage where the interview questions are formulated.

In the process of theoretical sampling and selective coding, the previously formed categories are integrated into conceptual categories. These conceptual categories can then be linked to existing theories that in turn can represent a building block for a new theory. The process continues until "theoretical saturation" is reached when no new concepts emerge from the data. This process is called "theoretical grounding" because the generated concepts are "grounded within the abductive theory" (Rahmani & Leifels, 2018). Theory contextualization and integration practically represent the process in which the generated theoretical explanation is matched with the context of the study (Rahmani & Leifels, 2018).

Abductive Grounded Theory is flexible in the way that it is not only used for generation of new theories and hypotheses, but also to adopt existing theories in order to explain contextual events (Rahmani & Leifels, 2018). This study is mainly an attempt to give plausible theoretical explanations to ongoing phenomena, while retaining the option to propose new hypotheses and proposals for further research, which is the reason why this method was chosen.

3.3 Data Collection

3.3.1 Pilot Interviews

To find the right questions and sample, four pre-interviews were carried out with industry professionals. These pre-interviews were either one or two phone calls that ranged from 15 to 45 minutes. The interviews were informal in nature. The respondents provided information about the latest research and about common challenges in the Finnish bioeconomy. Based on these conversations, the research questions were developed, and appropriate interview questions were formed (see Appendix). In Figure 6, this step of the process is categorized as 'Sensitizing Concept'. Open innovation was a topic area that seemed to be highly relevant during these discussions. Themes such as trust, knowledge sharing and commitment in relation to open innovation were discussed. In Table 1, the interviewee's title, the call duration and the means of communication of the pilot interviews are displayed.

Table 1 Pilot Interviews

Pilot Interviews		
Position	**Duration**	**Communication**
Bioeconomy researcher	56 min 30 min	Phone call Video call
Ecosystem facilitator	47 min 30 min 41 min	Phone call Video call Phone call
Executive at research institute	27 min 21 min 15 min	Phone call Phone call Phone call

3.3.2. Semi-Structured Interviews

The data was collected through semi-structured interviews in this study. In social sciences, interviewing is one of the most used methods for primary data collection. There are several different interview techniques: structured, semi-structured and unstructured interviews. Interviews are commonly used as a method to understand opinions and views, as well as facts (Guthrie, 2010).

In this study, semi-structured interviews were used for data-collection. Semi-structured interviews are often used when one does not want to limit the possibility to ask open-ended questions, while still maintaining some structure to the gathered data (Wildemuth, 2009).

Semi-structured interviews can be very time consuming, but in some cases, they can provide more valuable information than other methods as the method allows the researcher to be more flexible in order to obtain useful data (Adams, 2015). Semi-structured interview duration may typically vary between 30 minutes to over an hour (Jamshed, 2014). The method also requires more sophistication from the interviewer than other methods, such as structured interviews. The interviewer needs to be delicate and have some level of previous knowledge of the subject. Typically, multiple hours of verbal content have to be transcribed during the analytical process (Adams, 2015). Usually, semi-structured interviews include closed-response questions that often are followed by an open-ended question, such as “how?” or “why?” (Guthrie, 2010).

Semi-structured interviews as a method, is a suitable option for various tasks. The method allows the researcher to address a specific topic and representative sample flexibly and effectively. As mentioned, semi-structured interviews can be used as a method when an interviewer needs to ask open-ended questions that are strictly related to a certain topic. Conducting semi-structured interviews is a considerable option when one wants to interview certain individuals who play a key role (Adams, 2015). Semi-structured interviews can be conducted as one-on-one interviews or with focus groups (Jamshed, 2014). However, if the questions are of sensitive nature, one-on-one interviews is a preferable option. The method can be used for examination of territory that has not yet

been examined. In contrast, it can also be used in order to add depth and to supplement earlier research, such as drafted questionnaires (Adams, 2015).

The main topics that were discussed further were trust, commitment and knowledge sharing in the context of open innovation. In Table 2. The interviewee title, call duration and the means of communication of the semi-structured interviews are displayed.

Table 2 . Semi-Structured Interviews

Semi-structured interviews		
Position	**Duration**	**Communication**
R&D Manager	1h 7 min	Video call
Director of Innovation and R&D	1h 10min	Video call
Director of Strategic Development	57 min	Video call
R&D Manager	1h 11min	Video call
Executive at Research Institute	1h 29 min	Video call

In this study the respondents are called Respondent A, Respondent B, Respondent C, Respondent D, Respondent E. At the time of the interviews, Respondent E was an employee in the public sector and the rest were working in the private sector.

3.3.3 Rationale behind Data Collection Method

Semi-structured one-on-one interviews have been used as a data collection method in related research as well. In a study, where principal-agent problems were addressed through investigating corporate policies, a semi-structured interview was used as a method for collection of primary data. The interview method allowed the researchers to collect qualitative data about the specific theme at hand. Although other data sources such as statistics were used, the semi-structured interviews remained as the most valuable source of information to understand the existing challenges (Longo & Giaccone, 2017).

In another study, which was about collaboration in innovation ecosystems, semi-structured interviews were used as the main method for collecting primary data. The method was motivated by the explorative nature of the study. It however still allowed the researchers to follow the themes that followed their preliminary research framework (Valkokari et al., 2017)

In a third study, about digital enhancement of bioeconomy collaboration, semi-structured interviews were used as well. The interviews were about the participants' expectations of multidisciplinary collaboration (Ryymin et al., 2020).

All of these three studies are examples of how semi-structured interviews have been used in order to obtain valid research data. What these three studies have in common is that they interviewed participants that represent key positions in an organization. While using this method, they all intended to understand underlying structures and motivations of different actors in interorganizational collaboration. Additionally, each one of the three studies contains at least one closely related topic to my own area of research. These topics include open innovation, principal-agent theory, incentive design, information sharing, ecosystem collaboration, technology and/or bioeconomy. These three studies successfully managed to obtain necessary data by using semi-structured interviews in order to reach their research purposes. The research purposes and contexts are arguably similar to the ones of this study. Thus, they partially justify and support the validity of the chosen research method for this study.

The qualitative analysis methods used in these studies are similar to each other as well. The analyses were based on the thematic framework, enabled by the semi-structured interviews. Although the themes served as a basis for the structuring of data, the researchers had abductively used theoretical concepts to describe or explain the emerging idea/concepts. In one of the studies (Valkokari et al., 2017) it was explicitly stated to have used Grounded Theory in order to analyze its primary data.

3.4 Selection of Respondents

In this study, the primary data was collected from five interviewees who represent large companies. The participants together form a sample, although not a representative sample, of views and perspectives on open innovation ecosystems in the Finnish bioeconomy. The interviews were semi-structured one-on-one interviews.

Purposive sampling is a sampling method that is used in qualitative research. This technique is used to pick out cases that are considered information-rich in relation to the aims of the research (Palinkas et al., 2015). Purposive sampling is a nonrandom method and does not require underlying theories or a certain sample size to be valid. The researcher sets the criteria and decides what sample is purposeful for the study. Different methods of purposive sampling are used for different objectives. In this study, the purposive sampling method is expert sampling. Expert sampling is a method where knowledgeable cases are targeted. It can be especially useful when new areas of research are explored or when observational studies would require too many resources to draw any conclusions. It can also be useful to collect information about whether something should be studied further or not. Although all of the participants were selected through expert sampling in this study, a minority of the participants were also selected through snowball sampling. Snowball sampling is a method where participants are chosen through references. This method is particularly useful when the targets that fulfill the criteria are difficult to reach. It is a purposive sampling method as well as a convenience sampling method. Convenience sampling has been criticized because it is more likely to be biased in nonhomogeneous populations (Etikan, 2016).

The participants were chosen through the sampling methods. In order to fulfil validity criteria, they need to be knowledgeable about the given topics. Therefore, I set the following criteria for selecting the interviewees:

1. The interviewee works in the Finnish bioeconomy sector
2. The interviewee has a key role in decision-making and planning of innovation processes
3. The interviewee is familiar with the concept of open innovation and is actively taking part in open innovation initiatives

3.5 Scope of Data Collection

The aims of this study are to build a theoretical understanding of challenges that organizations tend to face in open innovation environments. To identify and describe challenges of incorporating external stakeholders in the context of open innovation in the Finnish bioeconomy sector. Additionally, the aim is to help accelerate open innovation in the Finnish bioeconomy. I have chosen to interview organizations that have over 1000 employees and that operate in the bioeconomy sector in Finland. However, the operational boundaries of these organizations are not limited to Finland. The respondents had minimum criteria, as explicated in the previous chapter.

The thematic content of this study is partly based on another study´s (Lauritzen & Karafyllia, 2018) way to categorize the different phases in which tensions between openness and knowledge sharing exist. The phases are *attracting, incorporating,* and *commercializing*. In this study, the key focus remained on the incorporation of external stakeholders. Thus, there was a focus on how information is being shared with external stakeholders once the initial contact is already done, the partner selection process is done and when there are mutual intentions between the focal organization and the external stakeholders to cooperate. Although attracting new collaboration partners and aspects of

commercialization of products and related legal aspects are considered relevant aspects, the key focus is to understand how organizations think and interact in their collaborative innovation efforts. In other words, the aim in this study was to focus on trust, openness, and commitment while organizations incorporate already existing external stakeholders in their innovation practices.

3.6 Coding as a Method for Qualitative Data Analysis

Coding is a technique that is used to identify and categorize meanings that emerge from a set of qualitative primary data. According to Charmaz (2006), coding is the process that forms the analytic structure from which an analysis can be built from. A code is usually a word or expression that symbolizes an interpretation of meaning. It can be applied to any form of qualitative data. Codes are meant to support structure to a researcher's qualitative analysis from which the researcher can not only recognize emerging patterns, but also has the potential to support the creation of new theories (Saldaña, 2013). In the Grounded Theory-version of Corbin and Strauss (1990), there are three main types of coding in the analytic process of Grounded Theory: open coding, axial coding, and selective coding.

3.6.1 Open Coding

The coding process starts when the first primary data is collected. This first stage of coding is called Open Coding. At this stage, simple concepts that derive from the primary data are labelled into so-called codes. By doing this the researcher can begin to break down the transcribed data into smaller pieces. Codes might be built from a wide range of properties that have something in common. For example, ‘dogs’, ‘cats’ and ‘monkeys’ can create a code called ‘mammals’ or ‘animals’. The relevance of the code and how specific the code name will be is up to the researcher. The process of breaking up the data into codes enables the researcher to make sense out of the collected qualitative data. These initial codes represent building blocks of a theory. (Strauss & Corbin, 2015)

3.6.2 Axial Coding

The second step of the coding process is called Axial Coding. At this stage the researcher looks for different relationships between the codes. These connections can be labelled into categories. These categories may represent abstract concepts. In other words, many code categories emerge from the initial codes. (Strauss & Corbin, 2015) In Figure 7 an example is shown of how an axial code is made in this study.

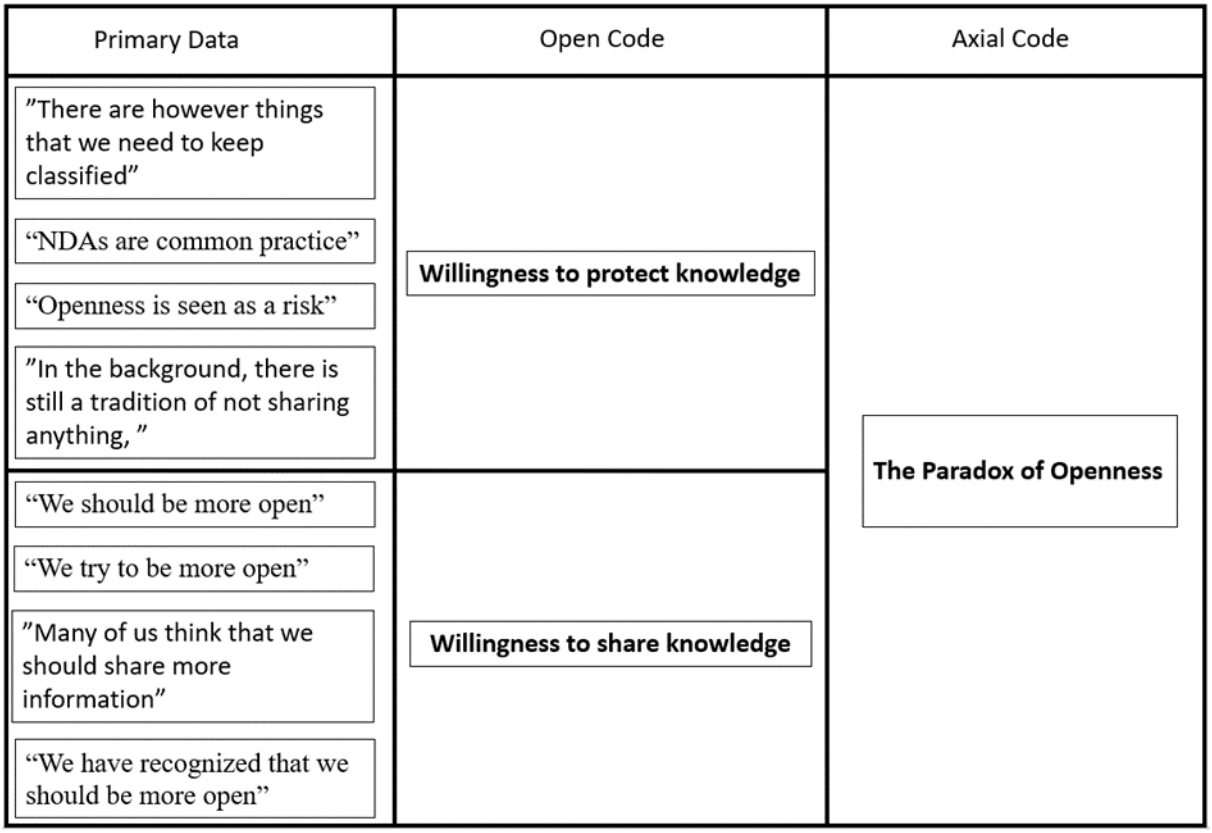

Figure 7 Example of the coding process: Open code to Axial code

3.6.3 Selective Coding

The third and the last stage of the coding process is called Selective Coding. The previously formed categories are formed into one core category which may represent a theory. It is at this stage when a new theory might arise, or earlier theory can be modified. (Strauss & Corbin, 2015)

Figure 8 represents an overview of the coding process for the proposed Openness Incentive Model. The proposed theoretical model will be further elaborated in Chapter 5.

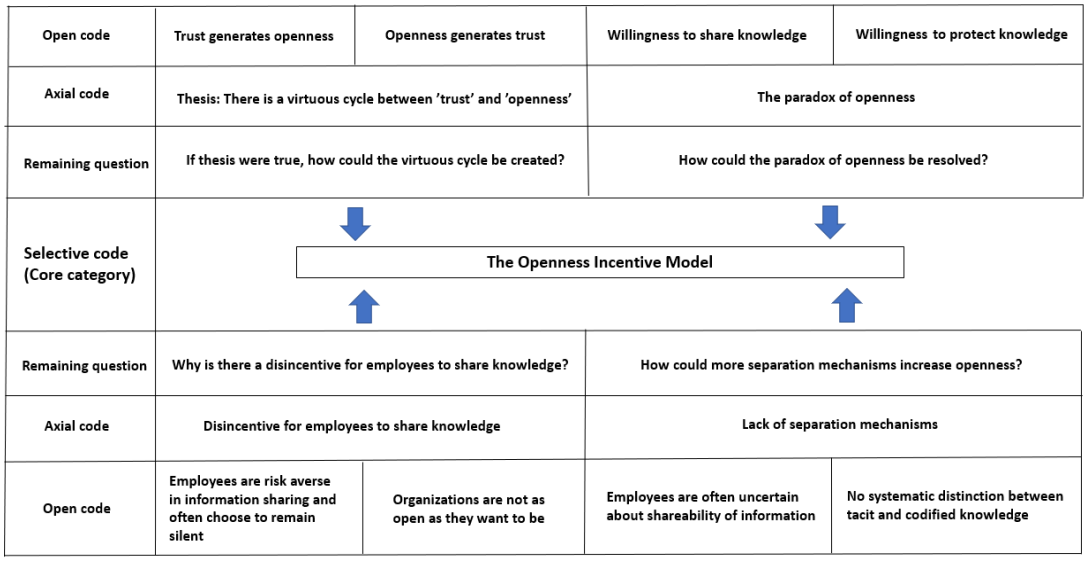

Figure 8 . Example of the coding process: Axial Code to Core Category

3.7 Research Quality

Aspects to consider while choosing a research method are relevance, validity, reliability and generalizability. In all research, one needs to make compromises while considering what aspects to put stronger emphasis on. (Guthrie, 2010)

Relevance refers to the practicality of the results. In other words, relevance is about whether something is worthwhile studying. (Guthrie, 2010) Considering earlier research conducted by Näyhä (2020), Van Lancker et al. (2016) and Paasi et al. (2020), this thesis contributes to a research area that needs more attention. Furthermore, European Commission has explicitly motivated the need for a development of a bioeconomy ("Bioeconomy", 2021). According to statistics, Finland, as well as other Nordic countries, have a relatively high presence in the European bioeconomy due to their richness of natural resources and developed industries within the bioeconomy. (Nordic Council of

Ministers, 2020; Lundmark & Hannerz, 2017) Therefore, one could argue that the relevance of this research aim, and the chosen research context can be considered high.

Research validity is about whether the data collected in the study is correct. In other words, it is about questioning whether one is measuring what one is aiming to measure. In chapter 3.4.3 in this thesis, the use of semi-structured interviews as a data collection method is justified. Namely, earlier research, covering similar research topics, has used semi-structured interviews to collect valid data.

In qualitative research, participants providing the qualitative data might for some reasons not always tell the truth (Guthrie, 2010). To allow the interviewees to speak more freely, in this study, they were told in advance that they will remain anonymous. This could have had a positive impact on research validity, as their name or company name will not be associated with information that might hurt their reputation. Thereby, they might have been more comfortable with telling the truth. However, to get correct information while using interviews for data collection, the interviewer should also take into consideration a potential interviewer bias. Namely, the interviewer may influence the interviewee with appearance, use of language and leading questions, among other factors. Therefore, the interviewer should try to appear as neutral as possible and use too academic terminology. In order to minimize the potential influence, the interviewer should try to talk less and focus on listening to what the interviewee has to say. (Guthrie, 2010)

If other researchers would conduct the same study again, while using the same methods and get the same results, the study's reliability can be considered to be high. (Guthrie, 2010) This study made similar findings as Näyhä (2020), Van Lancker et al. (2016) and Paasi et al. (2020), which could refer to a good reliability. On the other hand, the reliability of some new discoveries in this study, such as the proposed Openness Theory can still be questioned. Generalizability refers to how precisely the results of the study would be able to predict behavior of a larger sample size. (Guthrie, 2010) Although the sample size was relatively small, the discoveries in this study and the created models are potentially generalizable and could be similar in other contexts than this study. To verify the generalizability and reliability of the results, further research needs to be conducted.

4. Results

The categories in this chapter are main topics and findings that have arisen during the interviews. The text represents a qualitatively interpreted view of the respondents. In this chapter a new theorization called Openness Theory is introduced.

Incorporation of external stakeholders

The respondents had a consensus about the importance of interorganizational collaboration. There is a recognized need for transdisciplinary innovation, and organizations tend to be welcoming the idea of strategic alliances. One respondent mentioned that it is important to integrate external stakeholders into the processes instead of outsourcing something completely. It was emphasized that it is important to have internal human resources that can be involved in these new areas and cooperate with and learn from the external stakeholders. None of the respondents mentioned that there would be any specific stakeholder group that should be avoided.

In the early stages of innovation, universities and research institutes typically have an important role. The overall norm is to collaborate more with external stakeholders in the early Technology Readiness Levels and to become more and more independent in later stages. In other words, the readier the product becomes and the closer it is to commercialization, the more independently the organization will operate. For example, Respondent A formulated it as follows:

> "The further we are in the innovation process and the product develops the more it is in our hands" - Respondent A

One driving force behind this behavior is the willingness to get a good return of the investment by commercializing the product without having to share the profit. Other times it can stem from a rather profound worry of being too open. Being more open toward external stakeholders is typically seen as a risk among larger organizations.

However, in some cases, the collaboration might cease simply due to competition laws that may prohibit further collaboration in the later stages of TRL.

> "The business environment has also become stricter nowadays because the legal aspects restrict openness" - Respondent C

Another big challenge regarding incorporation of external stakeholders is the diversity of stakeholders. Respondents described it as follows:

> "To align the interests of different sized actors" - Respondent C

> "The diversity of stakeholders is also a big challenge, one needs to know how to connect with them, otherwise one will probably miss out on something" - Respondent D

The respondents described the experienced difficulties with cooperating with different sized actors and also the crucial importance of knowing how to communicate with different stakeholders. If the communication does not work, there is a higher chance of missing out on valuable information and possibilities.

The definition of ecosystems

Many of the larger organizations have power and influence in the ecosystems, in which they operate. One of the respondents criticized the fact that many larger organizations seem to want to "own" ecosystems, which thereby chokes and limits the activity. These ecosystems also tend to be very orchestrated and coordinated. In addition, the word 'ecosystem' is vaguely defined. A respondent mentioned that it seems that ecosystems are oftentimes just called 'ecosystems' although they are, in fact, rather recognized as larger projects than actual ecosystems. These so-called ecosystems are also often financing dependent. Moreover, the definition of ecosystems in Finland is too narrow, one respondent mentioned. Instead of having many financing-dependent projects called ecosystems, the whole Finnish bioeconomy could be viewed as one big ecosystem. Because of the small size of the ecosystems, it is difficult to create larger entities in the bioeconomy sector like there already are in, for example, the energy sector, the respondent adds.

Furthermore, another respondent suggested that collaborative innovation efforts should include employees from as many levels of the organization as possible, not only leaders. The information should also be easily accessible to everyone involved. The goal should be to increase the number of encounters of people involved and thereby also increase the exchange of knowledge. The diversity of people can also have an impact. For example, another respondent mentioned that researchers and people from the private sector should have more encounters with each other to fill the current gap that seems to exist between them.

Knowledge sharing and openness

The need for becoming more open towards external stakeholders is a recognized issue among the respondents and their represented organizations. It is particularly important that organizations are open about their needs and capabilities. Many organizations have recognized the need for becoming more open and tried to act accordingly in recent years.

> "Many years ago, we were in business areas where we had a long history and therefore, we had a strong skill set internally in these areas. One could say that there was not much need to collaborate with external stakeholders. Later we recognized that, in order to reduce the time to market of our innovation processes, we need to collaborate with others. Through collaboration with external actors, we also improve our own skill set in areas that we don't have. Furthermore, we can mitigate risk by being in an open ecosystem and improve our chances to get financing." - Respondent C

The level of openness of large organizations is also being criticized:

> "Very many big corporations do not understand the opportunities of open innovation. Instantly when "openness" is mentioned they see red lights and a risk" - Respondent A

> "Because of legal aspects, larger, more established companies tend to play it safe when it comes to information sharing" - Respondent E

Many organizations have identified what information shall be classified and what can be shared. At the same time, it is very common that organizations are not satisfied with the

level of openness in today's business climate. Although it is known that openness can bring on many opportunities, it is still predominantly being seen as a risk.

> "It is challenging to be open" - Respondent A

> "Of course, there are things that simply cannot be shared, but there has to be things that we could be more open within the context of open innovation" - Respondent A

> "We are becoming more open. We have communicated internally that we should become more open in order to go forward. The culture is changing more towards an open culture...but there is always room for improvement" - Respondent C

Many respondents mentioned that old traditions and a large organization size are factors that typically lead to a closed innovation mindset:

> "We are a big company, and it brings a lot of stiffness. Many of us will have to check things up (whether it is shareable or not) from here and there "-Respondent B

It was also implied that there is not much clarity within organizations in how open one can be, and that people can have different perceptions about openness:

> "When we talk about 'open innovation' one hears 'open' and another hears 'innovation'" - Respondent A

> "In the same ecosystem the views regarding openness can be quite different. For instance, one could be willing to publish everything whereas another would want to patent almost everything. It is difficult to find a common ground" - Respondent B

> "It is observable that we sometimes choose to not share anything with others. We just don't dare, because we are not completely certain where the limit goes for different topics" - Respondent B

> "Although people are trained, they have different perceptions about where the limits of how much can be shared are. This is a challenge" - Respondent C

Many employees think that more could be shared with external stakeholders. In the background however, there are old traditions still being reflected in today's actions. The tradition is often to not share anything as a default. It was also mentioned that different

people have different ideas of how open they can be towards external stakeholders. In some cases, the "organization" knows about the shareability of information, but the individual employees are not as certain. The individual employee can be risk averse and worried about sharing too much information. Typically, employees are rather completely silent when sensitive information is being involved.

> "We would have the capability to categorize knowledge into classified and shareable knowledge, but it is much easier for us to close the books and tell others what we need and do it together on our terms." - Respondent A

> "In some situations, it is indeed problematic when employees don't know what they actually could share. The collaborative relationship would be more beneficial if there would be a clear permission to be open about certain things…. Easily it comes to that that we won't share anything. And if we would share, then we would rather have an NDA in beforehand" - Respondent B

> "In public private partnership meetings people from middle management and lower levels of the organization are involved. For us there are not so clear rules, so "to not say anything" couldn't be easier" - Respondent B

It was also mentioned that people tend to think that information is more sensitive than it is. Moreover, although patenting is important for many, one respondent mentioned that there is too much patenting among companies and that it does not make sense in the bigger picture. One way of avoiding patenting is to make information public, accessible to anyone.

The paradox of openness

Although openness is a recognized positive attribute providing opportunities, openness is, according to respondents, also seen as a risk. That openness is seen as a risk implies that there is a lack of genuine trust toward external stakeholders. As in Paasi et al (2020), the paradox of openness is recognized in this study as well. Namely, there is a tension between being open and protecting knowledge. According to many respondents, Open collaboration is usually done in the early Technical Readiness Levels (TRL) and collaboration with others tends to diminish or cease completely in later stages of product

development. Thus, the readier a product is for commercialization the more protective organizations become about their knowledge.

Figure 9 is an illustration of what seems to be the typical case among the interviewed organizations. It presents an idea of how organizations tend to behave depending on what stage of product development they are in. The model highlights that time and product maturity are important aspects when organizations assess the shareability of their internal information.

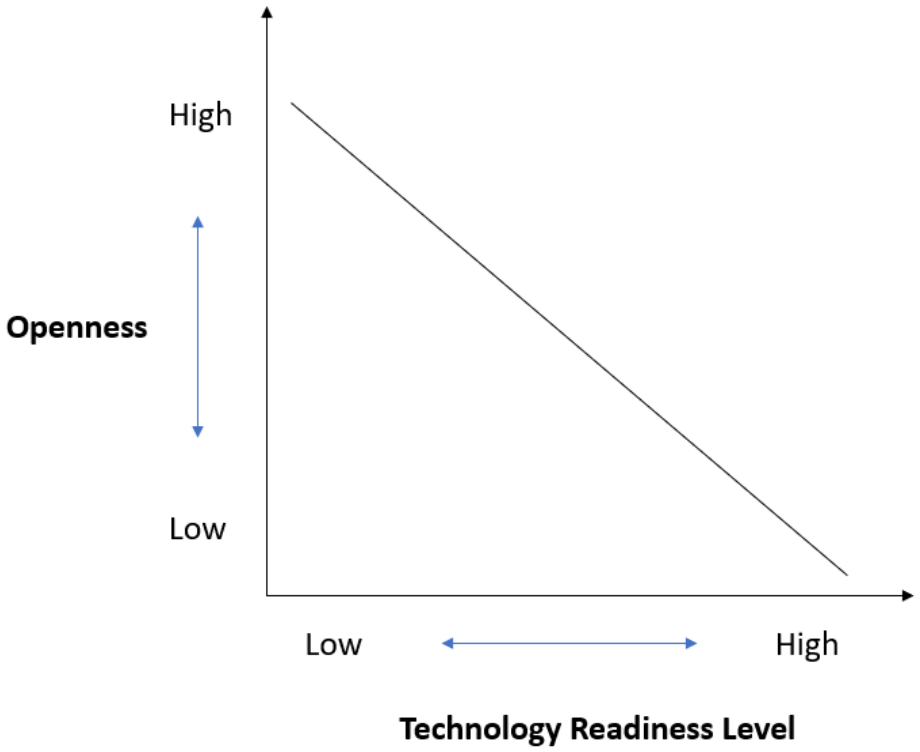

Figure 9 TRL - Openness Model

Categorization of information

Information is usually categorized in the organizations' internal databases. Information is usually categorized into for example materials or market areas. Many of the respondents said that the internal knowledge of their organizations is categorized as either public/shareable or internal classified information. As previously mentioned, the

respondents indicated that there typically is some uncertainty of knowledge shareability among individual employees. Additionally, nearly all of the respondents said that information would not be systematically categorized into tacit or explicit/codifiable knowledge. In general, respondents were aware that their organizations should lay more focus on knowledge management strategies.

> "We do not make systematic distinctions between tacit and implicit knowledge"
> - Respondent A

However, the same respondent later concluded:

> "The categorization of knowledge could actually be a good solution to some challenges"
> - Respondent A

Other respondents described it as follows:

> "We don't actively categorize tacit and explicit knowledge in a systematic manner, although we know that these distinctions exist. I think we can improve here" - Respondent B

> "Although we recognize that there is explicit and tacit knowledge, we do not have a systematic way of categorizing tacit knowledge" - Respondent E

The role of trust

Among the organizations goodwill trust is typically not measured in quantifiable terms. However, they will consider the earlier collaboration history and reputation of a potential collaboration partner. Additionally, these larger organizations often try to mitigate performance risk by measuring a potential partner's competence trust, especially when the potential collaborator is a startup. Among these companies, financial capability is typically a big factor while measuring competence trust. It was implied that organizations do background checks of their potential collaboration partners, but most often trust is a highly implicit and qualitative matter. According to respondents, trust is often dependent on the personal chemistry of those individuals involved.

> “Very often trust depends on interpersonal chemistry” - Respondent A

> “The building of trust ultimately comes down to human interaction. In other words, an organization does not trust an organization” - Respondent E

> “Often a partner wants to work together with a particular person of our organization. Therefore, sometimes if a person leaves our organization, collaboration might end with the other party”
> - Respondent E

It is hereby emphasized that the core of building trust still relies on the chemistry between the people interacting and that the relationship between stakeholders even can rely on specific individuals. The respondents had consensus about the importance of trust in interorganizational collaborative efforts. Trust is described to lie at the core of any relationship and that it is a very present topic while dealing with sensitive information.

> “Trust is the basis of everything...it is one of the biggest challenges” - Respondent C

When participants were asked what the best ways to build trust are, the following aspects were mentioned repeatedly:

- Openness and clarity is important
- Mutual vision, goals and benefits
- Mutual values on an organizational and personal level
- Acting honorably and respecting the rules
- A high exchange of tasks and services between collaborating parties
- Interpersonal chemistry of the participants involved
- Building trust takes time and trust must be earnt everyday

Restructuring and separation mechanisms

There is a consensus that Non-Disclosure Agreements (NDA) is a good tool to manage knowledge sharing. According to respondents, these agreements are simple, and they

bring clarity. One respondent said that NDA: s are used often as a start of a collaborative relationship. It was mentioned that

> "We don't collaborate without agreements" -Respondent B

> "Very rarely we collaborate without an NDA" - Respondent C

However, another respondent viewed that a relationship should initially start without any NDA: s. A third respondent also implied that NDA: s take presence in too early phases of collaboration which can possibly result in impacting negatively on building trust with the other party.

According to one respondent, his/her organization had managed to encourage openness successfully in a collaborative effort with another large company from another sector. As these two large companies together had been the main drivers and initiators of an ecosystem, they had by doing this, shown an example to other companies of trust-based collaboration. The first NDA was signed a year after they started to collaborate. This ecosystem also became successful thanks to the coordination of an external facilitating organization.

Time-to-market

According to one of the respondents, one problem is that in Finland people seem to think ideas themselves are very valuable and in general, people think that information is more sensitive than it is. It leads to a situation where people will not share information or ideas among each other. In some way it seems that people even get jealous about the ideas of others. This type of culture can also sometimes even be seen in university research. In Silicon Valley, for example there is a culture where ideas are exchanged more freely, and people help each other, the respondent adds. There the competition is more about who can realize these ideas faster and bring them to market. The respondent further emphasized that, one way this could change in Finland is that the focus in companies should lie more on time-to-market than on who owns the idea. In this case, time-to-market

refers to who introduces the idea to the market first. Oftentimes companies are perfecting their ideas and bringing them to market when it is already a bit too late.

Another respondent mentioned that companies could try to focus more on what could actually be shared and increase openness. One good reason to increase openness in collaborative innovation efforts is that external stakeholders will have a better picture in how to help and create even more value. Especially well-established companies often play safe and focus on risk mitigation, which limits openness. One respondent mentioned that larger organizations have "the luxury of time" which smaller companies don't have. This leads to situations where momentum is lost. Namely, smaller companies cannot always afford to wait in uncertainty.

Commitment

Predicting another party's commitment to collaborate is seen as a challenge. In general, there is a willingness that the future commitment of collaborating partners would become more predictable. Smaller companies usually drop out because of financial reasons and larger companies tend to drop out because of the availability of other more lucrative options. For some, the uncertainty of mutual commitment is accepted, and integrated into risk mitigation strategies. However, one respondent highlighted that sometimes looser settings, with no required commitment, are more favorable in the beginning. Respondents answered that the following are good practices for organizations to prove their commitment to external stakeholders:

- Investing human resources, time and money
- Public announcements
- Top level management involved
- Proactiveness

Financing

Most of the respondents highlighted that the financing of collaborative innovation projects could be improved. Now financing is not predictable enough. One respondent said that the financing cycles in Finland usually are six months to two years, while they in Sweden can be up to ten years long. Another respondent also mentioned that the timeframe should be much longer and added that there should be enough financing for the different phases in the innovation pipeline. If financing is not given throughout every step of the process, valuable time might be lost, and the time-to-market might be delayed.

The biggest ongoing challenges regarding incorporation of external stakeholders in open innovation environments:

When respondents were asked to summarize the biggest ongoing challenges regarding incorporation of external stakeholders in open innovation environments, the following aspects were highlighted:

- To be more open. Being open is seen as a risk. Among larger companies it seems that the full potential of open innovation is not truly understood. The term open innovation is understood and defined differently among different people. Some clarity in this area is needed.
- Clarity about definitions, rules and culture in open innovation is needed.
- The diversity of stakeholders is important, but also a challenge. It is difficult to find the best way to connect with different stakeholders.
- More resources are needed. We, for example, could use some assistance in how a good ecosystem works and how it's built.
- Larger companies in the bioeconomy have difficulties in finding a common agenda.
- Building trust can take many years.
- A lack of dedicated human resources for open innovation initiatives.
- When a part of a process is done there is often unnecessary waiting. In these situations, momentum is lost. For example, smaller companies do not have the "luxury of time".
- How information could be shared across projects.

4.1 Dealing with Uncertainty

According to some respondents, the terms open innovation and ecosystem are currently loosely thrown around by different personas in the sector. Namely, many seem to have different definitions of terms such as ‘open innovation’ and ‘ecosystem’. Taken all the respondents' answers into consideration, there is a need for clarity in strategy, innovation culture and definitions.

As mentioned earlier, there is a perceived lack of predictability in financing for collaborative innovation initiatives. The empirical results of this study show that there is a perceived short-term perspective in financing and that so-called ecosystems are often highly project based and financing dependent. According to one respondent, the Finnish business environment is characterized by short-sightedness.

> “Short-sighted commitment can be seen both in the public and the private sector”
> - Respondent E

Another respondent, in turn, said that the short-sightedness can be seen in the fact that businesses take mostly one step at the time and try to solve “closely related matters”. Also, the lack of long-term orientation can be seen in the type of stakeholder collaborations. Namely, according to a third respondent, ecosystems are often called ecosystems although they often are “just projects”. As previously mentioned, these projects or ecosystems can be highly dependent on financing and therefore limiting. It is hereby questionable whether the incentives for collaboration continuity are in place or if the projects are designed in a way that presupposes an anticipated end to the collaboration.

For this reason, the situation can be linked to the previously presented prisoner’s dilemma in Chapter 2. It could be argued that shorter financing perspectives and a higher uncertainty of further financing and continuity of collaboration would be factors that make the “game” seem shorter, which in turn makes the likelihood for another ‘player’ to defect higher. It is thereby possible to argue that longer timeframes in financing, accompanied by increased predictability, would increase certainty of continued interorganizational collaboration. Moreover, with more certainty of continued

cooperation, there would be more time to build trust-based relationships, which according to many respondents can be time consuming.

4.2 Openness Theory - A New Theorization

Openness Theory is a theory that is grounded in the qualitative empirical data of this study. Firstly, the theory tells us about why it is suboptimal to not share shareable information and secondly, about why shareable information is often not shared and thereby how it could be shared. In this way, the theorization contributes to the second research question in this thesis. The theory consists of two parts: The first part explains how being open toward external stakeholders can create value for an organization. The second part of the theory provides an explanation for why organizations sometimes are less open than they want to be. Furthermore, based on this theory practical solutions for the problem are suggested.

Results of the study conducted by Ritala et al. (2015) confirm that knowledge sharing to external stakeholders has a positive influence on innovation outcomes, but that accidental knowledge leakage can cause even greater harm. The study therefore suggests that there should be, along with the topic 'knowledge sharing', an emphasis on 'knowledge leakage' as well.

The illustrated model in Figure 10 is grounded in earlier research and in the empirical data of this study. According to Nielsen and Nielsen (2009), trust between organizations decreases knowledge protectiveness and thereby trust has a positive influence on interorganizational knowledge transfer. With this information combined with the interview responses, it is indicated that there is a peculiar relationship between openness and trust. Namely, openness creates trust in the receiving end and trust creates openness and the loop of trust and openness between involved actors continues.

> "If I share something, it is more likely that the other one shares" - Respondent D

"In bilateral communication openness can lead to increased trust" - Respondent E

"The more trust there is the more open the communication between collaborators will be" - Respondent E

However, the challenge is that it is difficult to be open in the first place when the receiver of the information cannot be fully trusted. This creates a 'chicken or egg' paradox, where it is difficult to determine cause and effect. What comes first, openness or trust? As soon as enough of either openness or trust exist, they may start a virtuous circle.

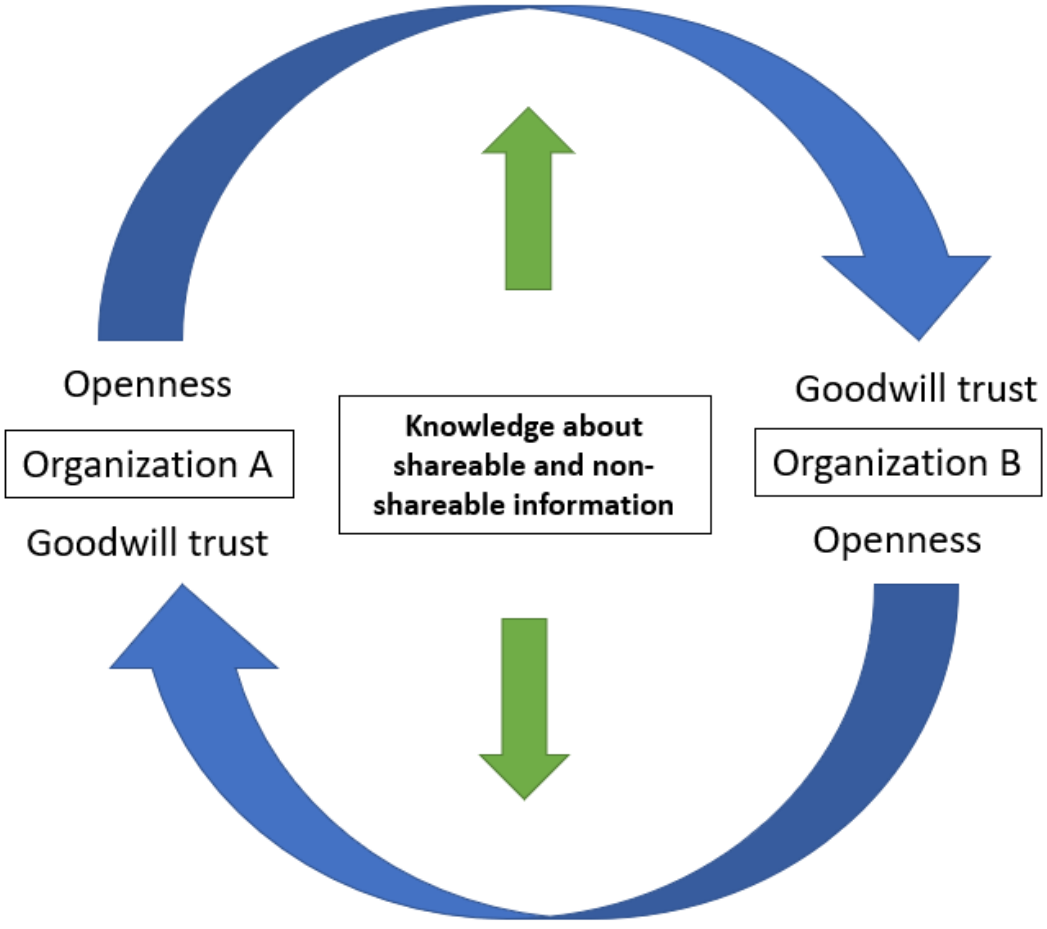

Figure 10 The Virtuous Cycle of Openness and Goodwill Trust

In Figure 10, the key variable is 'knowledge about shareable and non-shareable information'. Namely, it is a variable that determines the level of mutual openness and goodwill trust. Not only is a willingness to be open important, but the people also

involved in interorganizational collaboration must know what can be shared and what cannot. The more precisely it is known the more can be shared. The interviewees highlighted that many things often depend on interpersonal chemistry. This is compatible with Näyhä (2020), where the importance of individual human resources is emphasized. Based on Näyhä (2020) and interview responses, the individual employee perspective is necessary to consider, while researching interorganizational collaboration. According to many of the interview responses, one phenomenon that seems to happen frequently is that if people involved are not sure about what information can be shared and what cannot, the people will tend to choose to remain completely silent due to high risk aversion.

The Openness Incentive Model, in Figure 11, attempts to explain why an individual employee's rational choice often is to not be open although it is not always in the company's best interest. The Openness Incentive Model in Figure 11 also shows the reasoning of the key variable 'knowledge about shareable and non-shareable information' in Figure 10.

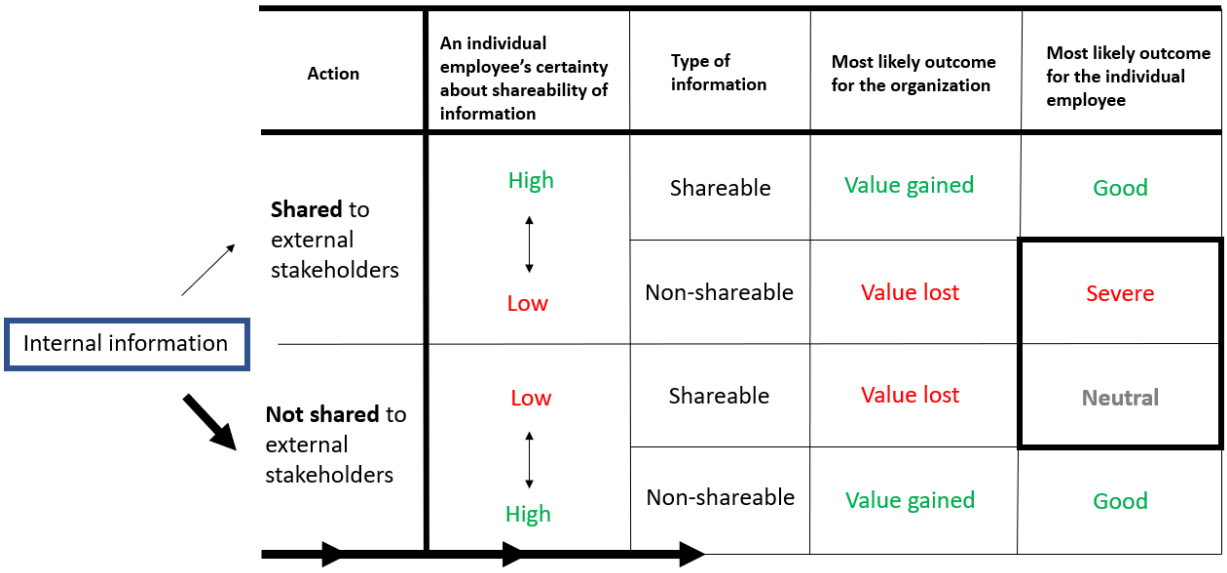

Figure 11 The Openness Incentive Model

As illustrated in Figure 11, an organization can do two things with its internal information: it can share it or not share it. The information can be shared or not shared either on a conscious or subconscious level. If an individual employee's level of certainty about the shareability of information is high, this person's rational choice is to share the

information that can be shared and not to share the non-shareable information. This is what most likely would be beneficial for the organization as can be seen in the chart. Under uncertainty about shareability of information an employee would weigh the alternatives and make a rational decision. This person's rational choice will be not to share anything, because the negative outcome is severe if non-shareable information is shared, but if shareable information is not shared this action remains unrecognized. In other words, under uncertainty the punishment of sharing the wrong information is most likely more severe than not sharing the right information, therefore this person chooses the less risky option which is not to share anything under the slightest uncertainty. A disincentive to be open is in this way created for the individual employee.

The Openness Theory highlights a conflict of interest between an organization and its individual employee's. It can further be argued that this is a type of principal-agent problem, where the principal (the organization) is risk neutral and the agent (the individual employee) is risk averse. Solving this conflict of interest by maximizing individual employees' knowledge about shareable and non-shareable information will enable a company to maximize its openness and thereby increase received openness, which in turn can create potential value for the organization. As an organization practices risk mitigation through not sharing shareable information that could be shared, the organization will lose potential value as it will not receive trust nor openness from its external stakeholders. This theory, including its models, is a simplified version of the complex reality. The purpose of the theory is essentially to allow decision makers and stakeholders to question whether the incentives for openness of individuals within their respective organizations are aligned with the organizational needs and long-term goals.

5. Conclusion and Discussion

5.1 Conclusion

Through the pilot interviews with industry experts, it was possible to find the relevant questions to ask in the semi-structured interviews, which was the primary data collection method in this thesis. Also, the aims were specified during the process. The aim was to build a theoretical understanding of challenges that organizations tend to face in open innovation environments. Moreover, the aim was to identify and describe challenges of incorporating external stakeholders in the context of open innovation in the Finnish bioeconomy sector. Fulfilling these scientific aims contributes to a third normative aim, namely, to help accelerate open innovation in the Finnish bioeconomy. In order to reach these aims, the following research questions were set:

i) What are the perceived challenges in open innovation within large organizations operating in the Finnish bioeconomy?
ii) What can organizations do to promote open innovation with external stakeholders?

The first question is exploratory, which is also characterizes this thesis. Therefore, there was a wide range of different challenges that were discussed during the interviews. Some of the respondents often mentioned the same type of perceived challenges, while other responses were more unique. One thing that each respondent had in common was that they admit that their organizations are not as open towards external stakeholders as they could be. Typically, these organizations regard openness as a challenge, which several respondents explicitly stated during the interviews. In line with Van Lancker et al. (2016) and Näyhä (2020), this study also finds that there is a recognized need for multidisciplinary knowledge in the bioeconomy. This study highlights the lack of trust between actors, which also is a topic raised by Näyhä (2020). Additionally, trust was not only highly valued by the respondents, but also commonly regarded as the very core of collaboration.

This study supports the previous findings of Paasi et al. (2020), by finding that the paradox of openness is a present issue in the Finnish bioeconomy. The practical implementation and knowledge about restructuring and separation mechanisms, as mentioned by Ritala and Stefan (2021), were not self-evident for most interviewees. This, in turn, suggests that open innovation and how to manage its challenges in practice, still needs more attention.

Another typical issue was clarity regarding innovation culture, innovation strategies and rules. Respondents often implied that there is a lack of consensus regarding the definition of open innovation and how to manage it. Most respondents recognized a short-sightedness in the Finnish business environment. This short-sightedness referred to either financing models for research and development or decision making and strategy in general.

After analyzing interviewee responses and earlier research, a new theorization called Openness Theory is presented in this thesis. A peculiar relationship between goodwill trust and openness is highlighted in this theory. The theory draws attention to the individual employees as rational decision makers within the organizations. It questions whether the incentives for the individual employees are aligned with their organization's visions of being more open toward its external stakeholders. The Openness Theory, together with the practical advice given by the respondents, gives indications of what organizations can do to promote open innovation with external stakeholders.

5.2 Discussion

6.2.1. Practical Implications and Recommendations

This subchapter answers the second research question in more detail and thereby contributes to the normative aim of this thesis. In accordance with the pragmatist philosophical stance, this thesis provides four managerial implications that can be derived

from the Openness Theory. These managerial implications are guidelines that might shed light on new perspectives on how to think about information sharing.

First, an organization should be aware of what can be shared and what cannot be shared. It should be kept in mind that there also might be information that is unnecessarily held classified. Second, the organization should make sure that the employees involved in external stakeholder collaboration are certain what can and what cannot be shared. In this way it is made sure that uncertainty about sensitive information is minimized, and thereby, the amount of knowledge that is shared can be maximized.

Third, with time information may become either more or less shareable, which means that organizations frequently need to inform their employees about knowledge shareability. This also means that organizations need to set mechanisms to be more diligent in frequent information classification or declassification. Fourth, involvement in collaborative innovation efforts should include employees from as many levels of the organization as possible, and not only leaders. The information should also be easily accessible to those involved. The goal should be to increase the number of encounters of people involved and thereby also to increase the exchange of knowledge. The diversity of people can also have an impact. For example, research and industry people should have more encounters.

In theory, the bottom-line is that all the information that can be shared, should be shared. Similarly, information that needs to be protected should be protected. It is the uncertainty of individuals that leads to suboptimal outcomes. Therefore, the awareness of knowledge shareability among individuals communicating outside the organizational boundaries should be increased. Simultaneously, the upper management, who decides on what can be shared and what cannot be shared, should be critical about the levels of protectiveness of internal information. The goal should be to be as open as possible and to have an open mentality toward external stakeholders, but not in a naive way. The message is that if organizations are open, they will more likely build trust and receive openness from their collaboration partners. The key is to know what information can be shared without causing any competitive disadvantage. In addition to the four managerial implications, it can be worthwhile to examine the results of this study to understand what others think about building trust, commitment and challenges in open innovation. By learning the

challenges and viewpoints of others, one can obtain a better understanding of how to approach external stakeholders in future innovation endeavors.

6.2.2 Theoretical Contributions

A few theoretical contributions were made in this study. Paasi et al. (2020), Ritala and Stefan (2021) and Laursen and Salter (2014) have all contributed to the recognition of and knowledge about the Paradox of Openness between organizations. However, so far a key focus on organizations has played a larger role than on the individuals representing them. While this thesis supports the earlier findings, it also brings back the attention toward the individual employee, acting in his or her personal interest as a rational thinker and decision maker. The major theoretical contribution of this study is the new theorization called Openness Theory. As this was an exploratory study with relatively few data sources, it is worth mentioning that the Openness Theory can be built on and even reformulated by further research.

The Prisoner's Dilemma and the perspectives on long term commitment in for example open innovation and financing models for research, could also be a plausible explanation for why companies are not as open as they desire to be. As openness in open innovation appears to be a common challenge, implementing the Prisoner's Dilemma perspective for long-term certainty in financing models could potentially have a substantial impact on open innovation.

6.2.3 Limitations and Suggestions for Further Research

The research aim is exploratory, and the research questions are therefore very open-ended. The results of this study gave many insights into the issues large Finnish organizations in the bioeconomy face with open innovation. For example, many respondents stated that their organizations struggle with achieving the desired level of openness. However, the interview structure was limiting in the sense that it was difficult to go in depth with this topic. In other words, this explorative approach gave the opportunity to scratch the surface of the ongoing challenges that large companies face in

the Finnish bioeconomy but did not give enough information to draw strong conclusions. That any strong conclusions could not be made was to be expected, as indicated by the formulation of the research aim and questions. For future research, a broader study could be conducted, involving more organizations where the challenges found in this study could be used as a starting point. A further study on this subject would both strengthen the validity of the findings in this thesis and be an opportunity to dive deeper into the formed categories of the perceived challenges.

The Abductive Grounded Theory as an approach gave me, as a researcher, a lot of freedom. The research aim, and thereby the questions, changed during the process. On one hand, it gave me the freedom to explore what could be relevant. This is in line with the pragmatist approach of this study. In one way, the thesis was about seeking relevant challenges and trying to understand why they exist. A more rigorous approach could have limited the freedom to explore something relevant. This thesis alone is not enough to draw any strong generalizable conclusions, although the new theoretical models in Openness Theory are meant to be applicable to multiple different contexts. One could say that the new theorization is a new hypothesis that should be verified. I hereby suggest that the new theorizations should be verified with not only more qualitative, but also quantitative research to come closer to more concrete solutions. The Openness Theory can be extended, more specified and reformulated. Also, the Openness Theory could be tested in other contexts, as there is nothing that indicates that it should be true strictly in the context of bioeconomy, as an industry, or Finland as a geographical area. As mentioned earlier, the research paradigm of this study was partly characterized by pragmatism. It is still possible to make the aims more pragmatic. For example, further research could try to find some more concrete solutions for best practice in open innovation and resolving the paradox of openness. This study mainly promotes a general idea about how to create trust by being open and giving guidelines of how some challenges could be approached.

By interpreting the interview responses, indications of consensus about the ‘The virtuous cycle of openness and goodwill trust’ can be seen. However, one respondent mentioned that it could be accurate in bilateral communication, but different in multilateral communication. The reason for this is that too much openness could be sometimes

regarded as being carefree about confidential information. In further research it could be worth taking this aspect into account.

With regards to the Prisoner's Dilemma and its relation to long- and short-term financing, the argument makes, on one hand, logical sense, as demonstrated. On the other hand, I have not highlighted the potential negative implications of long-term financing. This topic would open an entirely new complex discussion, because most likely there are multiple risks involved with long-term financing approaches. Whether to apply a long-term or short-term financing strategy can be regarded as a dilemma about commitment. Regarding this topic, this study is only a scratch on the surface. Thus, I hereby suggest that the long-term financing strategies, its implications on collaboration and its relationship to the prisoner's dilemma is an area that could be studied further.

In this study, the sample size was relatively small, as only five semi-structured interviews were conducted. The nature of the research aim was exploratory, and the method was qualitative. Therefore, any significant correlations could not be identified. The in-depth interviews allowed me to understand how the respondents regard certain challenges in their industry. As many respondents had similar answers it could be interpreted as an indication of a common challenge in the industry.

In this study there is not much emphasis on the respondents' backgrounds and personal interests. It is therefore important to recognize that many different factors might have impacted the respondents' views on the challenges in open innovation. Among other factors, the respondents age, experiences, and organizational culture, to mention a few, could impact formation of the respondents' opinions. For example, Respondent E who is employed by the private sector, largely had the same opinions as the rest of the respondents, but it can be noticed that respondent E was talking more generally about the Finnish market and long-term visions, whereas the rest of the respondents were more focused on their own organizations and their direct experiences with external stakeholders. To make further distinctions of, for example, how working for the private or public sector impacts the opinions of the respondents is beyond the scope of this study.

6. Summary in Swedish - Svensk sammanfattning

Öppenhetsparadoxen i öppen innovation bland stora organisationer i den finska bioekonomin

Inledning

Idag anses innovation inte bara vara en nyckel till framgång, utan också en fråga om överlevnad i en alltmer konkurrensutsatt global affärsmiljö (Lindemann & Boehmer, 2015; Abulrub & Lee, 2012). Så kallad öppen innovation är i huvudsak innovation över organisatoriska gränser (Chesbrough och Bogers, 2014). Tillsammans med den ökande globala konkurrensen finns det inte bara ett framväxande behov av innovation, utan även av att skydda kunskapen som finns inom organisationen (Hou & Wang, 2020).

Kontexten för studien är den finska bioekonomin. Enligt Europeiska kommissionen omfattar bioekonomin följande sektorer: "Primärproduktion, till exempel jordbruk, skogsbruk, fiske och vattenbruk, och industrier som använder/bearbetar biologiska resurser, t.ex. livsmedels-, massa- och pappersindustrin samt delar av den kemiska, biotekniska och energibranschen". (Europeiska kommissionen, 2021)

Inom bioekonomin finns det ett erkänt behov av tvärvetenskaplig kunskap (Van Lancker et al., 2016; Näyhä, 2020). Dessutom kommer det inom bioekonomin att behövas radikalt nya och disruptiva innovationer (Van Lancker et al., 2016; Lovrić et al., 2020).

Enligt Näyhä (2020) behöver den finländska skogsbaserade sektorn, som är en undersektor inom den finländska bioekonomin, mer uppmärksamhet när det gäller informationsdelning och genuint samarbete, på grund av bristande förtroende och alltför försiktiga attityder mellan aktörerna inom sektorn. Till sist uppmuntrar Näyhä (2020) till öppenhet och samarbete mellan företag. Med utgångspunkt i tidigare resultat fortsätter denna avhandling att utforska de upplevda utmaningarna när det gäller förtroende, engagemang och öppenhet i öppen innovation inom ramen för den finska bioekonomin.

Å ena sidan har tidigare forskning betonat att det finns ett ökat behov av interorganisatoriskt samarbete och öppen innovation (Chesbrough, 2003). Å andra sidan tyder tidigare vetenskapliga rön på att spänningar mellan öppenhet och behovet av att skydda kunskap från externa parter är ofta förekommande i samverkande innovationsinitiativ (Paasi et al., 2020; Laursen & Salter, 2014).

En ofta förekommande utmaning inom öppen innovation är öppenhetsparadoxen, som syftar på spänningen mellan öppenhet och behovet av att skydda kunskap (Laursen & Salter, 2014). I öppen innovation kan spänningen vara paradoxal, eftersom öppen innovation å ena sidan kräver en viss öppenhet, men å andra sidan måste organisationer säkra vinsterna av sina innovationsinvesteringar (Laursen & Salter, 2014). Öppenhetsparadoxen verkar vara förhärskande i innovationsekosystem inom flera olika sektorer, inklusive den finska bioekonomisektorn (Paasi et al., 2020).

En annan utmaning som kan uppstå i öppen innovation är fångarnas dilemma. Detta dilemma uppstår när två aktörer försöker samarbeta, men incitamenten att hoppa av samarbetet är större. En miljö, där fångarnas dilemma upprepas med högre sannolikhet, är bättre för fortsatt samarbete. (Yun, 2014) Det är därför relevant att ifrågasätta om den operativa verksamhetsmiljön stödjer ett långsiktigt perspektiv.

Förtroende, öppenhet och transparens är förutsättningar för framgångsrika metoder för öppen innovation (Westergren & Holmström, 2012; Chesbrough, 2003). Likaledes är bland annat förtroende och öppenhet de mest grundläggande värderingarna i den finska företagskulturen (Panapanaan et al., 2003).

Många av organisationerna inom den finska bioekonomin har offentligt kommunicerat att förtroende eller pålitlighet är ett av deras kärnvärden. De organisationer som står i fokus i denna avhandling är verksamma och/eller har andra intressenter även i andra nordiska länder, där kärnvärdena också är förtroende, öppenhet och transparens (Robinson, 2020). Även om de kulturella värderingarna stämmer överens med förutsättningarna för öppen innovation, verkar motsägelsefullt nog paradoxen med öppenhet enligt litteraturen vara en stor utmaning i den finska bioekonomin (Näyhä,

2020). Vad händer om finländska organisationer skulle kunna förbättra sin nuvarande praxis för öppen innovation ytterligare genom att integrera värden som redan är inbäddade i kulturen?

Syfte och forskningsfrågor

Denna explorativa avhandling har tre mål. För det första att bygga upp en teoretisk förståelse för de utmaningar som organisationer tenderar att möta i öppna innovationsmiljöer. För det andra att identifiera och beskriva utmaningar med att inkludera externa intressenter i samband med öppen innovation i den finska bioekonomisektorn. Uppfyllandet av dessa vetenskapliga mål bidrar till ett tredje normativt mål, nämligen att främja öppen innovation inom den finska bioekonomin. Detta sker genom att tillhandahålla en ny teoribildning som har sin grund i tidigare forskning och resultaten av denna avhandling. För att nå målen med denna studie ställs följande forskningsfrågor:

i) Vilka är de upplevda utmaningarna i öppen innovation inom stora organisationer som är verksamma inom den finska bioekonomin?

ii) Vad kan organisationer göra för att främja öppen innovation med externa intressenter?

Metod

Den metod som valts för forskningsprocessen i denna avhandling är baserad på abduktiv grundad teori. Abduktiv grundad teori bygger på begreppen abduktivt resonemang och grundad teori (Rahmani & Leifels, 2018). I denna kvalitativa studie samlades primärdata in genom att genomföra semistrukturerade intervjuer. Efter pilot-intervjuer med experter inom den finska bioekonomin genomfördes fem intervjuer med personer som representerade stora organisationer (med flera än 1 000 anställda) inom den finska bioekonomisektorn, varav en representerar den offentliga sektorn. Ytterligare kriterier som ställdes för val av respondenter var att den intervjuade har en nyckelroll i beslutsfattandet och planeringen av innovationsprocesser och att hen känner till

begreppet öppen innovation och deltar aktivt i initiativ för öppen innovation. Datainsamlingen genomfördes via videosamtal vars längder varierade mellan 57 minuter och en timme och 29 minuter.

Analysmetoden baserar sig på grundad teori och är en form av tematisk innehållsanalys som används för att skapa nya teorier eller för att ändra tidigare teori. Metoden innefattar tre faser som på engelska kallas open coding, axial coding och selective coding. Var och en fas i processen bildar kategorier som baserar sig på olika teman som har dykt upp under intervjuerna. De tidigare bildade kategorierna bildas i den sista fasen till en kärnkategori som kan representera en teori. Det är i detta skede som en ny teori kan uppstå eller en tidigare teori kan ändras. (Strauss & Corbin, 2015).

Resultat

De framkomna utmaningarna inom öppen innovation hos de intervjuade organisationerna kan klassas i följande kategorier: inkludering av externa intressenter, ekosystem, kunskapsdelning och öppenhet, öppenhetens paradox, kategorisering av information, förtroendets roll, tid till marknad, engagemang och finansiering.

Enligt resultaten visar det sig att organisationerna upplever att de inte är tillräckligt öppna gentemot externa intressenter i sitt samarbete. Organisationerna nämner att öppenhet är en utmaning, men förstår samtidigt dess betydelse för att påskynda innovation. I enlighet med tidigare forskning, visar sig öppenhetsparadoxen att manifestera sig i den finska bioekonomisektorn. Hur organisationerna skall ta ställning till denna paradox i praktiken visar sig vara en utmaning för dem. Samtidigt framkom det att det inte är tillräckligt konkret och tydligt inom organisationerna vilka reglerna för informationsgivande är gällande kulturen kring öppen innovation och innovationsstrategier. Det visar sig att samförstånd och en gemensam definition av öppen innovation saknas. En ytterligare utmaning som framkom i studien var att det upplevs saknas långsiktighet i den finska affärsmiljön. Det kom fram att ett mera långsiktigt perspektiv borde finnas när det gäller finansieringsmodeller för forskning och utveckling och beslutfattande i allmänhet.

Baserat på tidigare forskning kring ämnet och på de framkomna resultaten av den empiriska studien presenteras en ny teori som jag namngett som öppenhetsteorin (eng. Openness Theory). Teorin handlar om utmaningen mellan att inte dela och att dela intern information med externa intressenter, och vad dess konsekvenser är för organisationen och samarbetets potential. Teorin utforskar både hur öppenhet gentemot externa intressenter kan skapa mervärde och varför organisationer är mindre öppna än vad de strävar efter att vara. Syftet med teorin är i huvudsak att beslutsfattare och intressenter ska kunna ifrågasätta om incitamenten för öppenhet hos individer inom deras respektive organisationer är i linje med organisationens behov och långsiktiga mål.

Enligt öppenhetsteorin kan en organisation antingen välja att dela eller att inte dela sin interna information med externa intressenter. Detta kan ske på en medveten eller en omedveten nivå. En anställd som vet hur och om intern information får delas följer hen dessa riktlinjer vid informationsbehandling med externa intressenter. Att ha anställda som vet med säkerhet hur information får behandlas är troligen fördelaktigt för organisationen, eftersom rätt information tillhandahålls till rätt personer. Dock besluter sig anställda som inte är säkra på hur information får delas med externa intressenter högst sannerligen alternativet att inte dela, då detta anses som det mindre riskfyllda alternativet. En sådan situation kan leda till att organisationen går miste om potentiella möjligheter som informationsdelandet kunde ha medfört. Öppenhetsteorin hänvisar till vikten av att anställda vet hur de kan utnyttja företagets interna information vid samarbetande med externa intressenter. Delandet av fel information kan skada, men delande av rätt information möjliggör det för aktörerna att utnyttja de positiva aspekterna som öppen innovation kan medföra.

Diskussion och avslutning

Genom pilotintervjuerna med branschexperter kunde jag hitta relevanta frågor att ställa i de semistrukturerade intervjuerna, som var den primära datainsamlingsmetoden i denna avhandling. Avhandlingens forskningsfrågor var följande:

i) Vilka är de upplevda utmaningarna med öppen innovation inom stora organisationer som är verksamma inom den finska bioekonomin?

ii) Vad kan organisationer göra för att främja öppen innovation med externa intressenter?

Den första frågan är utforskande, vilket också är hur denna avhandling karaktäriseras. Därför fanns det ett brett spektrum av olika utmaningar som diskuterades under intervjuerna. Vissa av respondenterna nämnde ofta samma typ av upplevda utmaningar, medan andra svar var mer unika. En sak som var gemensam för alla respondenter var att de medgav att deras organisationer inte är så öppna gentemot externa intressenter som de egentligen skulle kunna vara. Typiskt sett ser dessa organisationer öppenhet som en utmaning, vilket flera respondenter uttryckligen uppgav under intervjuerna. Den andra frågan besvaras i samband med öppenhetsteorin. Utöver det kan de praktiska råden som respondenterna gav utnyttjas i praktiken.

Denna studie hade ett utforskande syfte och forskningsfrågorna är därför mycket öppna. Resultaten av studien gav många insikter i de problem som stora finländska organisationer inom bioekonomin står inför när det gäller öppen innovation. Till exempel uppgav många respondenter att deras organisationer kämpar med att uppnå den önskade nivån av öppenhet. Intervjuns struktur var dock begränsande i den bemärkelsen att det var svårt att gå på djupet med detta ämne. Med andra ord gav detta explorativa tillvägagångssätt möjligheten till att skrapa på ytan av de pågående utmaningar som stora företag står inför i den finska bioekonomin, men gav inte tillräckligt med information för att dra starka slutsatser. Att inga starka slutsatser kunde dras var väntat, vilket framgår av formuleringen av forskningens syfte och frågor. För framtida forskning skulle man kunna genomföra en bredare studie som omfattar fler organisationer där de utmaningar som konstaterats i den här studien skulle kunna användas som utgångspunkt. En ytterligare studie i detta ämne skulle både stärka validiteten av resultaten i denna avhandling och även vara en möjlighet att förstå de formade kategorierna av de upplevda utmaningarna på en djupare nivå.

Denna avhandling räcker inte ensam för att dra några starka generaliserbara slutsatser, även om de nya teoretiska modellerna i öppenhetsteorin är skapade för att kunna tillämpas i flera olika sammanhang. Man skulle kunna säga att den nya teoretiseringen är en ny hypotes som bör verifieras. Jag föreslår härmed att de nya teoribildningarna bör verifieras med inte bara mer kvalitativ utan även kvantitativ forskning för att komma närmare mer konkreta lösningar. Öppenhetsteorin kan i fortsättningen utvidgas, specificeras och

omformuleras. Dessutom skulle teorin kunna testas i andra sammanhang, eftersom det inte finns något som tyder på att den skulle vara sann enbart i samband med bioekonomisektorn, eller Finland som ett geografiskt område.

7. List of References

Journal Articles

Abu El-Ella, N., Bessant, J., & Pinkwart, A. (2015). Revisiting the Honorable Merchant: The Reshaped Role of Trust in Open Innovation. *Thunderbird International Business Review*, *58*(3), 261-275. https://doi.org/10.1002/tie.21774

Abulrub, A., & Lee, J. (2012). Open innovation management: challenges and prospects. *Procedia - Social And Behavioral Sciences*, *41*, 130-138. https://doi.org/10.1016/j.sbspro.2012.04.017

Adams, W. C. (2015). Conducting Semi-Structured Interviews. *Handbook of Practical Program Evaluation*, 492–505. https://doi.org/10.1002/9781119171386.ch19

Appleyard, M. and Chesbrough, H., (2017). The Dynamics of Open Strategy: From Adoption to Reversion. *Long Range Planning*, [online] 50(3), pp.310-321. Available at: <https://www-sciencedirect-com.ezproxy.vasa.abo.fi/science/article/pii/S002463011630067X> [Accessed 2 October 2021].

Boehmer, A. I. and Lindemann, U. (2015), "Open Innovation Ecosystem: Towards collaborative innovation", Proceedings of ICED'15 / the 20th International Conference on Engineering Design, Vol.8, Milan, Italy, July 27-30, 2015,The Design Society, Glasgow, pp. 31-40. Available from: https://www.researchgate.net/publication/307607475_Open_Innovation_Ecosystem_Towards_Collaborative_Innovation

Borgh, M., Cloodt, M. and Romme, A., (2012). Value creation by knowledge-based ecosystems: evidence from a field study. *R&D Management*, 42(2), pp.150-169. https://doi-org.ezproxy.vasa.abo.fi/10.1111/j.1467-9310.2011.00673.x

Chesbrough, H., (2012). Open Innovation: Where We've Been and Where We're Going. *Research-Technology Management*, [online] 55(4), pp.20-27. Available at: https://www-tandfonline-

com.ezproxy.vasa.abo.fi/doi/abs/10.5437/08956308X5504085 [Accessed 2 October 2021].

Chesbrough, H.W.; Bogers, M. (2014). Explicating open innovation: Clarifying an emerging paradigm for understanding innovation. In New Frontiers in Open Innovation; Chesbrough, H.W., Vanhaverbeke, W., West, J., Eds.; Oxford University Press: Oxford, UK,; pp. 3–28. Available from: https://oxford.universitypressscholarship.com/view/10.1093/acprof:oso/9780199682461.001.0001/acprof-9780199682461-chapter-1

Corbin, J., & Strauss, A. (1990). Grounded Theory Research: Procedures, Canons and Evaluative Criteria. *Zeitschrift Für Soziologie*, *19*(6), 418–427. https://doi.org/10.1515/zfsoz-1990-0602

Das, T. and Teng, B., (2001). Trust, Control, and Risk in Strategic Alliances: An Integrated Framework. *Organization Studies*, 22(2), pp.251-283. https://doi-org.ezproxy.vasa.abo.fi/10.1177/0170840601222004

Etikan, I. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1. https://doi.org/10.11648/j.ajtas.20160501.11

Foege, J., Lauritzen, G., Tietze, F. and Salge, T., (2019). Reconceptualizing the paradox of openness: How solvers navigate sharing-protecting tensions in crowdsourcing. *Research Policy*, [online] 48(6), pp.1323-1339. Available at: <https://www-sciencedirect-com.ezproxy.vasa.abo.fi/science/article/pii/S0048733319300216> [Accessed 2 October 2021].

Fort, H. (2003). Exploring the cooperative regimes in an agent-based model: indirect reciprocity vs. selfish incentives. *Physica A: Statistical Mechanics And Its Applications*, *326*(1-2), 286-298. doi: 10.1016/s0378-4371(03)00263-2

Gast, J., Gundolf, K., Harms, R. and Matos Collado, E., (2019). Knowledge management and coopetition: How do cooperating competitors balance the needs to share and protect their knowledge?. *Industrial Marketing Management*, [online] 77, pp.65-74. Available at: <https://www-sciencedirect-

com.ezproxy.vasa.abo.fi/science/article/pii/S0019850121000195?via%3Dihub#f0010> [Accessed 2 October 2021].

Getz, I., & Robinson, A. (2003). Innovate or Die: Is that a Fact?. *Creativity And Innovation Management*, *12*(3), 130-136. https://doi.org/10.1111/1467-8691.00276

Ghazinejad, M., Hussein, B. and Zidane, Y., (2018). Impact of Trust, Commitment, and Openness on Research Project Performance: Case Study in a Research Institute. *Social Sciences*, 7(2), p.22. DOI: 10.3390/socsci7020022

Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, *90-91*, 102098. https://doi.org/10.1016/j.technovation.2019.102098

Grönlund, J., Sjödin, D., & Frishammar, J. (2010). Open Innovation and the Stage-Gate Process: A Revised Model for New Product Development. *California Management Review*, *52*(3), 106-131. https://doi.org/10.1525/cmr.2010.52.3.106

Heeks, R., Ospina, A. V., & Wall, P. J. (2019). Combining Pragmatism and Critical Realism in ICT4D Research: An e-Resilience Case Example. *IFIP Advances in Information and Communication Technology*, 14–25. https://doi.org/10.1007/978-3-030-19115-3_2

Hou, T., & Wang, V. (2020). Industrial espionage – A systematic literature review (SLR). *Computers & Security*, *98*, 102019. https://doi.org/10.1016/j.cose.2020.102019

Jamshed, S. (2014). Qualitative research method-interviewing and observation. *Journal of Basic and Clinical Pharmacy*, *5*(4), 87. https://doi.org/10.4103/0976-0105.141942

Khin, E. W. S., Fui, L.Y. (2012b). Pragmatism and critical realism in management research. Actual Problems of Economics, 3(129), 359364. Retrieved from: https://www.researchgate.net/publication/260070588_Pragmatism_and_critical_re

alism_in_management_research#:~:text=Pragmatic%2Dcritical%20realism%20attempts%20to,actualized%20to%20produce%20particular%20outcomes

Lauritzen, G. D., & Karafyllia, M. (2018). Perspective: Leveraging Open Innovation through Paradox. *Journal of Product Innovation Management*, *36*(1), 107–121. https://doi.org/10.1111/jpim.12474

Laursen, K., & Salter, A. (2014). The paradox of openness: Appropriability, external search and collaboration. *Research Policy*, *43*(5), 867-878. https://doi.org/10.1016/j.respol.2013.10.004

Longo, M. C., & Giaccone, S. C. (2017). Struggling with agency problems in open innovation ecosystem: corporate policies in innovation hub. *The TQM Journal*, *29*(6), 881–898. https://doi.org/10.1108/tqm-02-2017-0020

Lovrić, N., Lovrić, M., & Mavsar, R. (2020). Factors behind development of innovations in European forest-based bioeconomy. *Forest Policy And Economics*, *111*, 102079. https://doi.org/10.1016/j.forpol.2019.102079

Nestle, V., Täube, F., Heidenreich, S., & Bogers, M. (2019). Establishing open innovation culture in cluster initiatives: The role of trust and information asymmetry. *Technological Forecasting And Social Change*, *146*, 563-572. https://doi.org/10.1016/j.techfore.2018.06.022

Nielsen, B., & Nielsen, S. (2009). Learning and Innovation in International Strategic Alliances: An Empirical Test of the Role of Trust and Tacitness. *Journal Of Management Studies*, *46*(6), 1031-1056. https://doi.org/10.1111/j.1467-6486.2009.00840.x

Näyhä, A. (2020). Finnish forest-based companies in transition to the circular bioeconomy - drivers, organizational resources and innovations. *Forest Policy And Economics*, *110*, 101936. https://doi.org/10.1016/j.forpol.2019.05.022

Oxley, J. E., & Sampson, R. C. (2004). The Scope and Governance of International R&D Alliances. *Strategic Management Journal*, *25*(8/9), 723–749. http://www.jstor.org/stable/20142159

Paasi, J., Valkokari, K., Rusanen, H., Makkonen, H., & Laiho, T. (2020). Paradox of openness: knowledge sharing-protection tension in ecosystems. In *The ISPIM Innovation Conference: Innovating in Times of Crisis* Lappeenranta University of Technology. Retrieved 29 March, from https://osuva.uwasa.fi/bitstream/handle/10024/12011/Osuva_Paasi_Valkokari_Rusanen_Makkonen_Laiho_2020.pdf?sequence=2&isAllowed=y

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), 533–544. https://doi.org/10.1007/s10488-013-0528-y

Panapanaan, V., Linnanen, L., Karvonen, M. and Phan, V., (2003). Roadmapping Corporate Social Responsibility in Finnish Companies. *Journal of Business Ethics*, [online] 44(2), pp.133-148. Available at: <https://www.researchgate.net/publication/226109222_Roadmapping_Corporate_Social_Responsibility_in_Finnish_Companies> [Accessed 2 October 2021].

Press, W. H., & Dyson, F. J. (2012). Iterated Prisoner's Dilemma contains strategies that dominate any evolutionary opponent. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(26), 10409–10413. http://www.jstor.org/stable/41602874

Rahmani, F., & Leifels, K. (2018). Abductive Grounded Theory: a worked example of a study in construction management. *Construction Management and Economics*, *36*(10), 565–583. https://doi.org/10.1080/01446193.2018.1449954

Richardson, R., & Kramer, E. H. (2006). Abduction as the type of inference that characterizes the development of a grounded theory. *Qualitative Research*, *6*(4), 497–513. https://doi.org/10.1177/1468794106068019

Ritala, P., Olander, H., Michailova, S. and Husted, K., (2015). Knowledge sharing, knowledge leaking and relative innovation performance: An empirical study. *Technovation*, 35, pp.22-31. https://doi.org/10.1016/j.technovation.2014.07.011

Ritala, P. and Stefan, I., (2021). A paradox within the paradox of openness: The knowledge leveraging conundrum in open innovation. *Industrial Marketing Management*, [online] 93, pp.281-292. Available at: <https://www-sciencedirect-com.ezproxy.vasa.abo.fi/science/article/pii/S0019850121000195?via%3Dihub#f0010> [Accessed 2 October 2021].

Robinson, S. C. (2020). Trust, transparency, and openness: How inclusion of cultural values shapes Nordic national public policy strategies for artificial intelligence (AI). *Technology in Society*, *63*, 101421. https://doi.org/10.1016/j.techsoc.2020.101421

Ryymin, E., Lamberg, L., & Pakarinen, A. (2020). How to Digitally Enhance Bioeconomy Collaboration: Multidisciplinary Research Team Ideation for Technology Innovation. *Technology Innovation Management Review*, 10(11): 31-39. http://doi.org/10.22215/timreview/1401

Valkokari, K., Seppänen, M., Mäntylä, M., & Jylhä-Ollila, S. (2017). Orchestrating Innovation Ecosystems: A Qualitative Analysis of Ecosystem Positioning Strategies. *Technology Innovation Management Review*, 7(3): 12-24. http://doi.org/10.22215/timreview/1061

Van Lancker, J., Wauters, E., & Van Huylenbroeck, G. (2016). Managing innovation in the bioeconomy: An open innovation perspective. *Biomass and Bioenergy*, *90*, 60–69. https://doi.org/10.1016/j.biombioe.2016.03.017

Van Maanen, J., Sørensen, J. B., & Mitchell, T. R. (2007). The interplay between theory and method. *Academy of Management Review*, *32*(4), 1145–1154. https://doi.org/10.5465/amr.2007.26586080

Westergren, U., & Holmström, J. (2012). Exploring preconditions for open innovation: Value networks in industrial firms. *Information And Organization*, *22*(4), 209-226. https://doi.org/10.1016/j.infoandorg.2012.05.001

Wright, P. C., & Roy, G. (1999). Industrial espionage and competitive intelligence: one you do; one you do not. *Journal of Workplace Learning*, *11*(2), 53–59. https://doi.org/10.1108/13665629910260743

Yun, J., (2014). New Perspectives on Open Innovation from Game The Prisoners' Dilemma and the Ultimatum Game. *Asia Pacific Journal of Innovation and Entrepreneurship 8(1):39-58*, [online] 8(1), pp.39-58. Available at: <https://www.researchgate.net/publication/315037493_New_Perspectives_on_Open_Innovation_from_Game_The_Prisoners'_Dilemma_and_the_Ultimatum_Game> [Accessed 2 October 2021].

Websites

Bioeconomy. European Commission - European Commission. (2021). Retrieved 26 March 2021, from https://ec.europa.eu/info/research-and-innovation/research-area/environment/bioeconomy_en.

Douven, I. (2017, April 28). *Abduction*. Stanford Encyclopedia of Philosophy. https://plato.stanford.edu/entries/abduction/

Ec.europa.eu. (2021). *What is the Bioeconomy - Research - European Commission*. [online] Available at: <https://ec.europa.eu/research/bioeconomy/policy/bioeconomy_en.htm> [Accessed 13 October 2021].

Nordic Countries 2021. Worldpopulationreview.com (2021). Retrieved 26 March 2021, from https://worldpopulationreview.com/country-rankings/nordic-countries.

Open Innovation. (n.d.). Open Innovation. Retrieved March 30, 2021, from https://openinnovation.eu/open-innovation/

Population of Europe (2021). Worldometers.info. (2021). Retrieved 26 March 2021, from https://www.worldometers.info/world-population/europe-population/.

Research Philosophy. (n.d.). Business Research Methodology. Retrieved 29 March 2021, from https://research-methodology.net/research-philosophy/#:~:text=Each%20stage%20of%20the%20research,base%20for%20the%20research%20strategy

Tilastokeskus.fi. 2021. *Trade*. [online] Available at: <https://www.tilastokeskus.fi/tup/suoluk/suoluk_kotimaankauppa_en.html> [Accessed 23 October 2021].

Reports

Lahtinen, H., Pekkala, H., Halme, K., Salminen, V, Härmälä, V., Wiikeri, J., Lamminkoski, H., Lähde, K., Mikkelä, K., Rouvinen, P., Kotiranta, A., Pajarinen, M., Dalziel, M., Barge, B., Meade, C. & Zhao, X., (2016). Government's analysis, assessment and research activities, (2016, October). *STARTUP-YRITYSTEN KASVUN AJURIT JA PULLONKAULAT*. Prime Minister's Office. https://tietokayttoon.fi/documents/10616/1034423/Startup-yritysten+kasvun+ajurit+ja+pullonkaulat/31152558-ae58-42ef-9cf0-e2483ec45bc1/Startup-yritysten+kasvun+ajurit+ja+pullonkaulat.pdf?version=1.0

Nordic Council of Ministers. (2020). *STATE OF THE NORDIC REGION 2020*. https://doi.org/10.6027/NO2020-001

Nordic Forest Research (SNS), Nordic Council of Ministers, Lundmark, T., & Hannerz, M. (2017, September). *Climate benefit of the Nordic Forests*. Nordic Council of Ministers. https://nordicforestresearch.org/wp-content/uploads/2019/08/nytryck-eng-A4-1.pdf

Books & E-books

Bhaskar, R. (2008). *Roy Bhaskar - A Realist Theory of Science: With a New Introduction* [E-book]. Taylor & Francis e-Library. https://uberty.org/wp-content/uploads/2015/09/Roy_Bhaskar_A_Realist_Theory_of_Science.pdf

Charmaz, K. (2006). *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis (Introducing Qualitative Methods series)* (1st ed.). SAGE Publications Ltd.
http://www.sxf.uevora.pt/wp-content/uploads/2013/03/Charmaz_2006.pdf

Chesbrough, H. W. (2003). Open innovation: *The new imperative for creating and profiting from technology.* Harvard Business School Publishing Corporation. https://www.nmit.edu.my/wp-content/uploads/2017/10/Open-Innovation-the-New-Imperative-for-Creating-and-Profiting-from-Technology.pdf

Guthrie, G. (2010). Interviews. In *Basic research methods: An entry to social science research* (pp. 118-128). [E-book] SAGE Publications India Pvt Ltd. https://www-doi-org.ezproxy.vasa.abo.fi/10.4135/9788132105961.n11

Morgan, G., & Burrell, G. (1979). Sociological Paradigms and Organisational Analysis: Elements of the Sociology of Corporate Life (1st ed.). Routledge. https://doi.org/10.4324/9781315242804

Saldaña, J. (2013). *The coding manual for qualitative researchers*. Los Angeles: SAGE Publications. http://emotrab.ufba.br/wp-content/uploads/2020/09/Saldana-2013-TheCodingManualforQualitativeResearchers.pdf

Saunders, M., Lewis, P., and Thornhill, A. (2019). *Chapter 4: Understanding research philosophy and approaches to theory development. Research Methods for Business Students.* [E-book]. Pearson Education Limited. https://www.researchgate.net/profile/Mark-Saunders-10/publication/330760964_Research_Methods_for_Business_Students_Chapter_4_Understanding_research_philosophy_and_approaches_to_theory_development/links/5c53056f299bf12be3f0e2cf/Research-Methods-for-Business-Students-Chapter-4-Understanding-research-philosophy-and-approaches-to-theory-development.pdf

Strauss, A. L., & Corbin, J. M. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. 4th Edition (pp.6-8). [E-book]Thousand Oaks: Sage Publications. https://books.google.nl/books?id=MaKWBQAAQBAJ&printsec=frontcover&dq=grounded+theory+definition&hl=fi&sa=X&ved=2ahUKEwjug_Oi14fvAhUBDuwKHRb8A8IQ6AEwBHoECAYQAg#v=onepage&q&f=false

Wildemuth, B. M. (2009). Semistructured Interviews [E-book]. In L. Luo (Ed.), *Applications of Social Research Methods to Questions in Information and Library Science* (Second Edition, pp. 253–256). Libraries Unlimited. https://books.google.nl/books?hl=fi&lr=&id=uv98DQAAQBAJ&oi=fnd&pg=PA248&dq=semi+structured+interviews&ots=VVKMGdS1gi&sig=pgdqD3hN4QAc4Xb-70EMY1UBfGQ&redir_esc=y#v=onepage&q=semi%20structured%20interviews&f=false

8. Appendices

Interview questions

1. Do you incorporate external stakeholders in your innovation processes?

1.1. If yes, which ones? and how? If no, why not?

2. How do you capture/utilize knowledge that comes from outside your organization?

3. Do you make systematic distinctions between types of knowledge? If yes, How?

4. Are there any particular challenges when it comes to sharing (sensitive) knowledge with external stakeholders?

4.1. How have you dealt with these challenges so far?

5. Do you have a systematic strategy in place regarding information revealing?

5. 1. Could you give an example?

6. Do you evaluate trustworthiness of other organizations that participate in an open innovation ecosystem?

6.1. How? Could you give an example?

7. What is the best way to build trust with external stakeholders?

8. What is your view on uncertainty about long-term commitment of other participants/organizations in open innovation ecosystems?

9. Is it preferable that the other participating organizations prove that they are committed to a project before committing yourself?

9.1. How can companies prove their commitment?

10. Finally, what would you say are the biggest challenges regarding incorporation of external stakeholders in open innovation environments?

11. Do you have some other thoughts regarding our discussed topics?